# 2012 DATA SUMMARY REPORT

# HUDSON RIVER PCBS SUPERFUND SITE

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| | |
|---|---|
| °C | degrees Celsius |
| Anchor QEA | Anchor QEA, LLC |
| ASTM | American Society for Testing and Materials |
| BMP | Baseline Monitoring Program |
| CAM | Corrective Action Memoranda |
| CCV | continuing calibration verifications |
| Cd | cadmium |
| COC | chain-of-custody |
| CU | Certification Unit |
| DDS | downstream deposition study |
| DGPS | Differential Global Positioning System |
| DO | dissolved oxygen |
| DQO | data quality objective |
| DSR | Data Summary Report |
| DVM | data verification module |
| EDD | electronic data deliverable |
| EDI | Equal Discharge Increment |
| eDMS | environmental data management system |
| EDV | electronic data verification |
| EPA | U.S. Environmental Protection Agency |
| ESI | Environmental Standards, Inc. |
| GC/ECD | Gas Chromatograph/Electron Capture Detector |
| GE | General Electric Company |
| IUPAC | International Union of Pure and Applied Chemistry |
| L | liter |
| LCS | laboratory control spike |
| LD | laboratory duplicate |
| m | meter |
| MADIS | multiple aliquot depth integrating sampler |
| MDL | method detection limit |
| mGBM | modified Green Bay Method |

| | |
|---|---|
| mm | millimeter |
| MS | matrix spike |
| MSDs | matrix spike duplicates |
| ND | non-detect |
| NOAA | National Oceanic and Atmospheric Administration |
| NYSDEC | New York State Department of Environmental Conservation |
| Pb | lead |
| PCB(s) | polychlorinated biphenyl(s) |
| PE | performance evaluation |
| PPE | personal protective equipment |
| QA | quality assurance |
| QC | quality control |
| QDQ | Qualitative Data Quality |
| QEA | Quantitative Environmental Analysis, LLC |
| RA CD | Remedial Action Consent Decree |
| RAM QAPP | Remedial Action Monitoring Quality Assurance Project Plan |
| RAMP | Remedial Action Monitoring Program |
| RL | reporting limit |
| RPD | relative percent difference |
| SAV | submerged aquatic vegetation |
| SOP | Standard Operating Procedure |
| TOC | total organic carbon |
| TSS | total suspended solids |
| Wibby | Wibby Environmental |
| WQ | water quality |

# 1 INTRODUCTION

This Data Summary Report (DSR) has been prepared on behalf of the General Electric Company (GE) by Anchor QEA, LLC (Anchor QEA) in conjunction with Environmental Standards, Inc. (ESI). In accordance with GE's approved *Phase 2 Remedial Action Monitoring Quality Assurance Project Plan* (Phase 2 RAM QAPP; Anchor QEA and ESI 2012), this DSR presents a summary of several types of data collection activities conducted by GE in the Upper Hudson River in 2012 as part of the Phase 2 Remedial Action Monitoring Program (RAMP), along with the associated results. Specifically, this report provides a summary of the following: 1) the water column sampling performed during in-river remedial activities in 2012 (at both near-field and far-field stations), as well as the water sampling performed in the off seasons prior to and after those activities in 2012; 2) the fish sampling performed in the Hudson River in 2012; 3) two special studies conducted in 2012, the Baseline Surface Sediment and Downstream Deposition Study and the Stillwater Buoy-based Far-field Station Study; and 4) the sampling of submerged aquatic vegetation (SAV) in certain upcoming Phase 2 dredge areas. This report documents the field and laboratory work performed as part of these sampling activities in 2012, reports the data, and presents the results of the associated data quality assessment. This report is submitted pursuant to Sections 2.9.1, 3.11, 9.2.1.8, and 9.3.2.8 of the Phase 2 RAM QAPP.

## 1.1 Report Objectives

The objective of this DSR is to document the field and laboratory activities associated with the collection and analysis of the water and fish samples collected in 2012, the sediment and water samples collected as part of the above-mentioned special studies, and the SAV samples collected in 2012. This documentation includes describing the methods, reporting the data, and presenting the results of the applicable data quality assessments. Water samples were analyzed for whole water polychlorinated biphenyls (PCBs), whole water metals, dissolved metals, total organic carbon (TOC), and total suspended solids (TSS). Sediment samples were analyzed for PCBs, grain size, and TOC. Fish samples were analyzed for PCBs and lipid content. SAV samples were analyzed for PCBs. Analytical methods for these matrices are identified in Sections 2.1.5, 2.2.1, 2.3.4 and 2.4.2. Data interpretation presented in this report is limited to assessing data quality and usability.

## 1.2 Report Organization

This DSR is divided into six sections that summarize the 2012 field and analytical activities for the above-mentioned sampling programs, as follows:

- Section 1 includes the introduction and objectives.
- Section 2 provides a summary of the methods used during the water sampling program (both during in-river activities and in the off-seasons), the fish sampling program, the special studies, and the SAV sampling program in 2012.
- Section 3 summarizes the quality assurance (QA)/quality control (QC) methods used for the 2012 sampling programs.
- Section 4 presents the results of the near-field and far-field water sampling (including the off-season far-field water monitoring), the fish sampling program, the Baseline Surface Sediment and Downstream Deposition Study1, and the SAV sampling activities.
- Section 5 presents an assessment of data quality.
- Section 6 contains the references cited in this report.

Seven appendices are included that provide documentation for the various field, laboratory, and data validation activities.

[1] The results of the Stillwater Buoy-based Far-field Station Special Study were provided in a previously submitted technical memorandum that is included as an appendix to this DSR, as discussed below.

# 2 METHODS

## 2.1 2012 Water Sampling Program

### *2.1.1 Near-field Monitoring*

Near-field monitoring was performed in 2012 whenever dredging, capping, and/or backfilling activities were being conducted in the river. Near-field monitoring was initiated on May 9, 2012, and continued until dredging-related activities were completed on November 16, 2012.

#### *2.1.1.1 Sampling Locations*

As specified in Section 2.3 of the Phase 2 RAM QAPP, the near-field monitoring area extended from just upstream to a point approximately at least 300 meters (m) downstream of the dredging operations. Dredging operations were monitored with a single buoy deployed upstream of dredging operations and up to four monitoring buoys deployed along a cross-river transect downstream of operations (Figure 2-1). When dredging occurred in two distinct areas of the river, a downstream monitoring transect was deployed below each dredging operation. The near-field cross-river transects were adjusted in the field in response to project logistics. At the end of the 2012 dredging season, dredging operations were occurring in relatively close proximately to the Thompson Island Dam, preventing deployment of a downstream near-field buoy transect. During this time, with U.S. Environmental Protection Agency (EPA) approval, the automated far-field station at Thompson Island was used in lieu of the near-field buoy transect.

#### *2.1.1.2 Sample Collection Procedures*

Samples were collected using ISCO® samplers following procedures detailed in Appendix 2.3-1 in the Phase 2 RAM QAPP. When the Thompson Island far-field station was used in place of a near-field transect, the standard far-field sampling procedures were followed as specified in Appendix 2.6-3 in the Phase 2 RAM QAPP.

##### *Background Buoy*

The background buoy was located upstream of all dredging operations. Samples were collected from mid-depth in the water column in 1-hour aliquots and composited over 24

hours. These samples were submitted on a daily basis (Monday through Friday) for analyses of Aroclor PCBs and TSS. Samples collected on Saturday and Sunday were retrieved and submitted on Monday for such analyses. Once per month, a grab sample was collected and submitted for analysis of PCBs by the modified Green Bay Method (mGBM), which allows for determination of the concentrations of individual PCB homologs.

### *Near-field Transect*

The near-field cross-channel transect was located approximately 300 to 1,000 m downstream of each distinct area of dredging. These distances varied to accommodate project logistics; the buoy locations were typically selected to be in areas that minimized the potential for disruption of vessel traffic. Monitoring was performed at four stations along this transect; sample aliquots were collected from mid-depth in the water column at 1-hour intervals and composited over 24 hours. The samples from each transect station were then combined into a single, flow-proportioned composite and submitted on a daily basis (Monday through Friday) for analyses of Aroclor PCBs and TSS. Samples collected on Saturday and Sunday were retrieved and submitted on Monday for such analyses. Flow proportioning was based on hydrographic data at the near-field transect.

The automated station at Thompson Island was not used for far-field monitoring during 2012; however, it was used in place of the downstream near-field monitoring buoy transect from October 30 to November 19, 2012. The configuration of the Thompson Island automated station and sample collection procedures are consistent with those at the Lock 5 automated station (described in Section 2.1.2.2.2). An ISCO sampler collected hourly aliquots, which were used to form a 24-hour composite. These samples were submitted daily (Monday through Friday) for Aroclor PCB and TSS analyses. Samples collected on Saturday and Sunday were retrieved and submitted on Monday for such analyses.

For the first 4 weeks of the 2012 dredging program, near-field samples were also analyzed for hardness and total and dissolved lead (Pb) and cadmium (Cd). The near-field metals

sampling was discontinued on June 4, 2012, because the criteria specified in Section 2.3.3 of the Phase 2 RAM QAPP were met.[2]

#### *2.1.1.3 Non-routine Sampling*

Manual sampling was conducted above the Thompson Island Dam cable on May 30, 2012; one sample was collected and submitted for Aroclor PCB and TSS analyses. This sampling was part of an early dredging season diagnostic sampling event. Specifically, on May 30, 2012, a sample was collected behind the Three Sisters Islands and submitted for Aroclor PCB analysis; samples were collected from water within an observed surface sheen between the middle island and the east shore. Results for these samples can be found in Appendix A.

### *2.1.2 Far-field Monitoring*

As specified in Section 2.4 of the Phase 2 RAM QAPP, far-field monitoring was initiated approximately 1 week prior to the start of dredging operations and continued until after dredging was completed and concentrations return to approximate background levels. In 2012, far-field monitoring was conducted from May 3 through November 29.

#### *2.1.2.1 Sampling Locations*

The far-field monitoring area comprises the portion of the Hudson River that is greater than 1 mile downstream from active dredging operations. Far-field monitoring stations are located at or near stations historically used for the Hudson River Baseline Monitoring Program (BMP) sampling (QEA and ESI 2004; Figure 2-2). The general locations of these stations (from upstream to downstream), as well as their purposes are as follows:

- Bakers Falls (background station)
- Rogers Island (used as a background station to calculate PCB loading originating upstream of remediation)
- Thompson Island Dam (off-season monitoring)
- Lock 5 at Schuylerville (remediation monitoring)

[2] The Phase 2 RAM QAPP specified: "If the data collected during that initial 4-week period show that the concentrations of dissolved lead and cadmium are substantially below the applicable Aquatic Acute Water Quality Standards, metals analyses will be discontinued for the remainder of the season."

- Stillwater (remediation monitoring)
- Waterford (remediation monitoring, monitor loading to Lower Hudson River)
- Albany (lower river)
- Poughkeepsie (lower river)

Far-field sampling was performed at the following frequency:

- Daily at Lock 5 and Waterford (Sunday through Friday; Saturday samples were collected and submitted on Sunday)
- Weekly at Stillwater
- Monthly at Bakers Falls, Rogers Island, and at the Lower Hudson River stations at Albany and Poughkeepsie

### *2.1.2.2 Sample Collection Procedures*

Far-field monitoring included collection of samples from a number of stations along the river using either manual or automated methods. Sampling at the far-field stations was conducted following procedures detailed in the Phase 2 RAM QAPP, as summarized below.

#### 2.1.2.2.1 Manual Sampling

At Bakers Falls, Stillwater, Albany, and Poughkeepsie, a variable-speed crane was used to lower a custom-designed multiple-aliquot-depth-integrating sampler (MADIS) through the water column to collect depth-integrated samples. Photographs of the boat-mounted crane and MADIS sampler are shown in Figures 2-3 and 2-4, respectively.

Depth-integrated samples were taken on a monthly basis at the approximate centroid of the river cross-section from the downstream side of the Bakers Falls Bridge (County Route 27 Bridge). In addition, at Rogers Island, monthly surface grab samples were collected at a point near the center of the channel upstream of all areas dredged since 2009, but downstream of the former Fort Edward Dam; these samples were collected on the same day that the monthly grab samples were collected from the background buoy (Section 2.1.2.2). The samples from these stations were submitted for analysis of PCBs by the mGBM and for TSS analysis. To satisfy the lower PCB analytical sensitivity requirements at these stations, 8 liters (L) of water were collected for each PCB sample from Bakers Falls and Rogers Island.

At the Stillwater monitoring station, manual depth-integrated samples were collected on a weekly basis during the dredging season. A single composite sample was prepared each week from equal volume aliquots collected from four Equal Discharge Increment (EDI) locations.[3] These locations were upstream of the County Route 125 Bridge, to the west of the entrance to the Lock 4 land cut. These samples were submitted for analyses of Aroclor PCBs and TSS (with PCB analyses by the mGBM conducted on a weekly basis for the first 2 months of dredging).

Lower Hudson River sampling at Albany and Poughkeepsie was conducted monthly. The samples collected at each of these stations consisted of a single depth-integrated composite collected at the approximate centroid of the river cross-section. These samples were submitted for analyses of Aroclor PCBs and TSS.

#### 2.1.2.2.2 Automated Sampling

The automated far-field monitoring stations located at Lock 5 (Schuylerville) and Waterford collect water samples using pumps located on shore through piping that extends from the pump house into the river. At the Lock 5 location, the piping terminates in the river at pump intake structures that have been placed at locations that correspond to an EDI. The Waterford station piping terminates at a single point co-located with the water intake for the Town of Waterford. The pumping system at all locations supplies water to a stilling well in the pump house on a continuous basis. A refrigerated Teledyne ISCO sampler was used to collect samples for PCB and TSS analysis from the stilling well. The sampler was programmed to collect aliquots at each 1-hour time interval to provide 24-hour composite samples. Samples from the Lock 5 and Waterford stations were submitted daily from Sunday through Friday for analyses of Aroclor PCBs and TSS. Samples collected on Saturday were retrieved and submitted on Sunday for such analyses. In addition, analyses of PCBs by the mGBM were conducted on samples from these stations on a weekly basis.

[3] Historical BMP sampling at Stillwater was conducted at five EDI locations; in 2012 four locations were used to coincide with the buoy locations as part of the Stillwater Buoy-based Far-field Station Study (discussed in Section 2.2.2).

### 2.1.3 Spring High Flow Sampling

No spring high flow events were sampled in 2012.

### 2.1.4 Off-season Water Column Monitoring

Off-season water monitoring was conducted during 2012 from the beginning of January through April 23, 2012, in accordance with the *2011 Remedial Action Monitoring Quality Assurance Project Plan* (2011 RAM QAPP; Anchor QEA and ESI 2011). The program was reinitiated upon completion of the far-field monitoring program on November 29, 2012, and followed sampling procedures outlined in the Phase 2 RAM QAPP. Off-season sampling was performed weekly at Thompson Island, Lock 5, and Waterford and monthly at Bakers Falls, Rogers Island, and at the Lower Hudson River stations at Albany and Poughkeepsie (to the extent that weather and river conditions allowed). ISCO samplers were used to collect 24-hour composites from the automated far-field stations. Manual samples were collected using the MADIS at all other stations except Rogers Island, where surface grabs were collected. Samples were submitted for analyses of PCBs by the mGBM, TSS, and TOC during the pre-dredging period. During the post-dredging period samples were submitted for analysis of Aroclor PCBs and TSS that were collected from the Thompson Island, Lock 5, and Waterford stations and for analyses of PCBs by the mGBM and TSS for samples collected from Bakers Falls, Rogers Island and the Lower Hudson River stations. Water quality (WQ) data were collected continuously from the stilling wells within the Thompson Island, Lock 5, and Waterford far-field stations and at the time of sample collection for the remaining stations.

### 2.1.5 Analytical Program

The 2012 near-field, far-field, and off-season water analytical programs are summarized in Tables 2-1, 2-2, and 2-3, respectively. The analytical methods listed in these tables are described in detail in Section 2.7 of the 2011 RAM QAPP and Section 2 of Attachment A of the Phase 2 RAM QAPP.

Aroclor PCB analysis was performed by Pace Analytical Services, Inc. (Pace) using Pace standard operating procedure (SOP) NE231_02 (2011 RAM QAPP, Appendix 2.7-5; Phase 2 RAM QAPP, Attachment A, Appendix A2-4), which is based on Gas Chromatograph/

Electron Capture Detector (GC/ECD) Method 508. PCB analysis of water samples was also performed by Pace using the mGBM, as described in Appendices 2.7-6 and 2.7-7 of the 2011 RAM QAPP and Appendices A2-5 and A2-6 of Attachment A of the Phase 2 RAM QAPP. The mGBM was optimized for the Phase 2 RAMP to include a second column (CP-SIL5-C18) analysis for the full resolution and individual measurement of certain dichlorobiphenyl congeners—International Union of Pure and Applied Chemistry (IUPAC) 4 and IUPAC 10—which coelute on the DB-1 column in the mGBM. Extraction and analysis techniques for PCBs in the Hudson River water were customized based on whether sampling stations require lower detection limit methods. The procedures employed were modifications to existing methods to improve sensitivity and/or to take advantage of current extraction technology. Brief descriptions of the extraction and analytical methods for routine samples (1-L for both mGBM analysis and Aroclor PCB analysis) and large-volume samples (approximately 8-L for mGBM analysis) are described in Section 2.7.1 of the 2011 RAM QAPP and Section 2 of Attachment A of the Phase 2 RAM QAPP.

Pace also analyzed 1-L water samples for TSS following the standard EPA protocol (Standard Method 2540D) for the analysis of suspended sediment, with modifications consistent with the American Society for Testing and Materials (ASTM) D3977-97 Standard Test Methods for Determining Sediment Concentration in Water Samples, Test Method B – Filtration (2011 RAM QAPP, Appendix 2.7-8; Phase 2 RAM QAPP, Attachment A, Appendix A.2-7).

TOC analyses (only for pre-dredging off-season samples) were also performed by Pace using Standard Method 5310B as described in the 2011 RAM QAPP, Appendix 2.7-9.

Dissolved and total metals (Cd and Pb) were analyzed by EPA Method 200.8 (Phase 2 RAM QAPP, Attachment A, Appendix A2-8) by TestAmerica-Burlington. Samples were also analyzed for hardness by Standard Method 2340B (Phase 2 RAM QAPP, Attachment A, Appendix A.2-11).

### 2.1.6 Water Quality Field Parameters

#### 2.1.6.1 Near-field Buoys

Real-time WQ data were collected continuously from the near-field buoys when they were in operation. The buoys were equipped with automated samplers, multi-parameter WQ sondes, data logging systems, and near-real-time data transmission capabilities. The WQ sondes were deployed at approximately 50% of the water column depth. WQ parameters consisting of dissolved oxygen (DO), conductivity, temperature, pH, and turbidity were measured and transmitted to a project environmental data management system (eDMS) at approximately 15-minute intervals.[4] The calibration of the multi-parameter sonde (sonde) was checked in accordance with the procedures specified in the Phase 2 RAM QAPP.

As a first step in data QA, data collected by the sonde probes were verified using an automatic system built into the data management system. The system compared the probe-measured data to established ranges and acceptable drift criteria. In the event that the data fell outside of the acceptable ranges or exceeded acceptable drift, the data were qualified appropriately, and descriptive notes were entered by field personnel.

#### 2.1.6.2 Manual Sampling Locations

WQ measurements were taken in conjunction with manual sampling activities. Instantaneous surface WQ measurements were taken at mid-depth in the water column at each EDI or single point location at the time of sample collection. These measurements included temperature, specific conductivity, pH, DO, and turbidity using a sonde. The manual WQ measurements were uploaded to the project eDMS at the end of each sampling day.

#### 2.1.6.3 Automated Stations

Real-time WQ data were collected continuously at the Lock 5 and Waterford far-field automated stations year round and at the Thompson Island station during the off-season monitoring. WQ parameters consisting of DO, conductivity, temperature, pH, and turbidity

[4] A detailed explanation of the eDMS is presented in Section 10.5 of the Phase 2 RAM QAPP.

measurements were collected and transmitted to the project eDMS at 15-minute intervals. The sonde calibration checks were consistent with the near-field buoys.

## 2.2 Special Studies

Two special studies were specified in Section 9 of the Phase 2 RAM QAPP—the Baseline Surface Sediment and Downstream Deposition Study and the Stillwater Buoy-based Far-field Station Study.

### *2.2.1 Baseline Surface Sediment and Downstream Deposition*

The Baseline Surface Sediment and Downstream Deposition Study actually comprised two related studies: 1) the Baseline Surface Sediment Study to measure baseline PCB concentrations in surface sediments in areas downstream of and within Phase 2 dredge areas; and 2) the Downstream Deposition Study to identify the spatial extent, concentration, and mass of PCBs deposited in areas downstream from dredging as a result of dredging activities, through post-dredging resampling of baseline sampling locations. The first of these studies was initiated by EPA in 2010, and GE continued both study components in 2011 and 2012.

The original EPA study design included collection of 113 surface sediment samples and six duplicates from River Section 1, 114 surface sediment samples and six duplicates from River Section 2, and 130 surface sediment samples and six duplicates from River Section 3, as specified in the EPA QAPP (SERAS 2010).

GE and EPA agreed to modify the sampling locations and procedures for River Section 2, as described in Section 9.3 of the Phase 2 RAM QAPP. Samples collected in River Section 2 were composited based on sediment type and close proximity in accordance with Section 9.3.1.3 of the Phase 2 QAPP using the following approach:

- Locations within the same Certification Unit (CU) and sediment type (according to the side scan sonar) were composited.
- Locations outside of dredge areas in close proximity and within the same sediment type were composited.
- The number of locations in each composite sample ranged from one to four.
- The target number of composite samples equaled 54.

- The basis for this approach was to minimize variability that sample location and sediment type may have on PCB concentrations.

The sediment locations were sampled twice during 2012. As part of the Baseline Surface Sediment Study, the locations were sampled from June 5 to July 3, 2012, to provide baseline data. This study was supplemented with the Downstream PCB Deposition Study. As described in Section 9.3.2 of the Phase 2 RAM QAPP, the Downstream PCB Deposition Study involved resampling the locations of the Baseline Surface Sediment Study after the majority of dredging activities were completed in fall 2012; thus, these samples included solids that deposited on the riverbed downstream of dredging. The Downstream PCB Deposition Study was conducted from October 23 to November 9, 2012. It was not possible to collect samples at a subset of the targeted locations due to a lack of sediment. The locations where samples were collected and the approach followed to form the composite samples are presented in Section 4.4.1.

Results for River Section 2 are provided in Section 4.4.1. The results of the sampling performed during 2011 in River Section 1 are presented in a Technical Memorandum entitled *Results of Baseline Surface Sediment and Downstream PCB Deposition Special Studies* (Anchor QEA 2012a), submitted by GE to EPA in January 2012.

The chemical and geotechnical analyses performed for the surface sediment samples are described in Section 4 of Attachment A and include Aroclor PCBs analysis by the GEHR8082 method (Attachment A, Appendix A.4-1); TOC by the Lloyd Kahn method (Phase 2 RAM QAPP, Attachment A, Appendix A.6-1); moisture content (in extraction SOPs in Phase 2 RAM QAPP, Attachment A, Appendices A.4-3 through A.4-5); and grain size by ASTM D422 (Phase 2 RAM QAPP, Attachment A, Appendix A.6-2).

### *2.2.2 Stillwater Buoy-based Far-field Station*

The Stillwater Buoy-based Far-field Station study, as described in Section 9.2.3 of the Phase 2 RAM QAPP, was developed to evaluate the feasibility of using a buoy-based far-field monitoring system at Stillwater in place of the prior manual depth-integrated sampling method. A sampling transect of four monitoring buoys equipped with ISCO samplers was

deployed in the vicinity of the manual Stillwater monitoring location. Buoy-based monitoring was performed at four stations along this transect; aliquots were collected at 5-minute intervals from mid-depth in the water column over a 1-hour period. The samples from each station were then combined into a single, flow-proportioned transect composite. Manual depth-integrated sampling was conducted concurrently with buoy sampling following procedures specified in Section 2.1.2.2.1. Both sets of samples were collected in duplicate.

These samples were analyzed for PCBs by the mGBM, Aroclor PCBs, and TSS. The paired sampling was conducted from May 31 to July 18, 2012, and included eight sampling rounds. At the conclusion of the eight rounds, the data provided by each method were compared. The sampling methodology and results of this study are detailed in a Technical Memorandum entitled *Evaluation of Buoy-based Far-field Monitoring Station at Stillwater* (Anchor QEA 2012b), which GE submitted to EPA on December 13, 2012 (Appendix E).

## 2.3 2012 Fish Sampling Program

The fish monitoring program continued in 2012 in accordance with Section 3 of the Phase 2 RAM QAPP. Adult fish were sampled in the spring, and yearling pumpkinseed and forage fish were sampled in the fall. Fish collection was targeted within the following four pools of the Upper Hudson River and three locations in the Lower Hudson River:

- Feeder Dam Pool (one station)
- Thompson Island Pool (five stations)
- Northumberland Pool (four stations)
- Stillwater Pool (five stations)
- Albany/Troy (one station; below Federal Dam in the spring and Albany turning basin in the fall)
- Catskill (one station; spring only)
- Tappan Zee (one station; spring only)

The spring and fall fish sampling transect locations are depicted in Figures 2-5 and 2-6, respectively.

### 2.3.1 Spring Sampling

Spring fish sampling occurred on April 17, April 24, May 2, May 21 through May 25, and May 29 through May 30, 2012 (Table 2-4). During sampling, adult species of black bass (largemouth and smallmouth bass), perch (yellow and white perch), and ictalurids (brown and yellow bullhead and channel and white catfish) were targeted from the 15 stations in the Upper Hudson River. The Lower Hudson River locations were sampled for black bass and ictalurids (Albany/Troy and Catskill stations), perch (Albany/Troy), and striped bass (Albany/Troy, Catskill, and Tappan Zee stations). A total of 467 samples were collected from the spring sampling locations (Figures 2-5a through 2-5k), corresponding to 145 individuals from the black bass group, 145 from the bullhead group, 125 from the perch group, and 52 striped bass (Table 2-4). Collections of adult fish targeted the legal or edible total lengths are as follows:

- Bass: 305 millimeter (mm)
- Bullhead/catfish: greater than 200 mm
- Yellow perch: greater than 170 mm
- White perch: greater than 160 mm
- Striped bass: greater than 457 mm

A total of 20 individuals per species were collected from the Feeder Dam Pool and from each of the Albany/Troy and Catskill stations.

In the Thompson Island Pool, 30 individuals per species were targeted (five individuals per species from TD1, TD2, TD3, and TD4). At the historical location behind Griffin Island (TD5), ten individuals per species were targeted. At TD5, nine extra bullhead and three extra yellow perch were collected to make up for a lack of those species found at stations TD1, TD2, and TD4. At TD4, three extra bass and six extra yellow perch were also collected to make up for a lack of those species at TD2. At TD3, five individuals per species were collected.

In the Northumberland Pool, 25 individuals per species were targeted (five at each of locations ND1 through ND5). Because location ND4 was abandoned after the first year of the BMP due to lack of fish and habitat, ten individuals per species were collected from ND5

to compensate. At ND1, ten bullhead and seven yellow perch were collected to make up for a lack of those species at ND2. At ND3, five individuals of each species were collected.

In the Stillwater Pool, 30 individuals per species were collected, with 5 individuals per species collected from SW1 and SW2. At SW3, ten individuals each were collected for bass and bullhead and 14 (ten targeted plus four extra) yellow perch were collected to make up for a lack of fish at SW4 and SW5. At each of SW4 and SW5, five individual bass and bullhead were collected, along with four yellow perch at SW4 and two yellow perch at SW5.

At the Tappan Zee station, 12 striped bass were collected.

### *2.3.2 Fall Sampling*

Forage fish and yearling pumpkinseed were collected from September 4 through September 6, 2012, from the Upper Hudson River locations and the Albany/Troy location (Figures 2-6a through 2-6i). A total of 175 samples were collected from all locations (Table 2-5). Forage fish were collected as whole-body composites and included spottail shiner, fallfish, mimic shiner, bluntnose minnow, and golden shiner (one species per composite); species collected were dependent on availability. A total of 50 composites were targeted from the locations sampled in the fall (ten composites per pool; Table 2-5). Yearling pumpkinseeds were captured from each pool and submitted as whole-body individual samples. Pumpkinseeds were considered yearlings if they were between 70 and 130 mm total length, in accordance with the requirements in Section 3.5.1 of the Phase 2 RAM QAPP.

In the Feeder Dam Pool, 20 pumpkinseed and ten forage fish were collected and composited. At the Albany/Troy location, 20 pumpkinseed and ten forage fish were collected and composited.

In the Thompson Island Pool, 30 pumpkinseeds were collected, with ten individuals from the historical location across from Griffin Island (TD5) and five individuals from each of the four other Thompson Island Pool stations. Ten forage fish were collected and composited, with two composites from each station.

In the Northumberland Pool, 25 pumpkinseeds were collected, with ten individuals collected from ND5, five from ND2, and three from ND1. Seven individuals (five targeted plus two extra) were also collected from ND3 to make up for the lack of fish at ND1. Ten forage fish composites were collected, with two composites each from stations ND1, ND2, and ND3 and four composites from ND5.

In the Stillwater Pool, 30 pumpkinseeds were collected, with ten individuals from the historical location at Stillwater (SW5) and five individuals from each of the four remaining stations (SW1, SW2, SW3, and SW4). Two forage fish composites were collected at each station within the pool.

### *2.3.3 Sampling Methods*

Electroshocking, gillnetting, and angling were used to collect target species. Samples of the edible portions for human and wildlife consumers of fish were prepared as follows:

- Fillets for bass, ictalurids, perch, and striped bass
- Individual whole-body samples for pumpkinseed
- Whole-body composites for spottail shiners or other forage fish species

Electrofishing was accomplished with an 18-foot boat equipped with a variable output gas-powered DC generator. Operating amperage was adjusted according to water conductivity to minimize injury to fish; stunned fish were immediately removed from the electrical field using dip nets to minimize the duration of the shock. Striped bass were captured using gill nets (300 feet long with a depth of 8 feet and 6-inch monofilament mesh) from the Tappan Zee location due to the higher water conductivity in this area, which limited electrofishing effectiveness. In addition, angling was conducted at the Tappan Zee location to collect additional samples not captured with gill nets. Gill netting at Tappan Zee was suspended due to incidental capture of shortnose (*Acipenser brevirostrum*) and Atlantic sturgeon (*A. oxyrinchus oxyrinchus*)—both of which are listed as endangered by National Oceanic and Atmospheric Administration (NOAA) Fisheries—and the need to avoid capture of these species. Fish were held in live-wells or buckets with frequent water changes during collection. Fish were sacrificed by a blow to the head or by cervical dislocation.

Sampling methods were generally consistent with procedures outlined in Section 3 of the Phase 2 RAM QAPP. Adult fish were collected along transects at each station during spring 2012. Transects were approximately 200 to 2,000 m in length and were located parallel to the shoreline in water approximately 1 to 3 m deep (Figures 2-5a through 2-5k).

Fish collected in the fall were generally along the same transects sampled in the spring. Fall transects at a few stations were in slightly different areas than adult fish locations consistent with historical New York State Department of Environmental Conservation (NYSDEC), BMP, and Phase 1 RAMP sampling locations. Transects were approximately 200 to 1,000 m in length and were located parallel to the shoreline in water approximately 1 to 3 m deep (Figures 2-6a through 2-6i). Fish were handled according to standard procedures developed by NYSDEC (2000), and utilized during the BMP and specified in the Phase 2 RAM QAPP. At the Albany/Troy location, several yearling pumpkinseed were collected from the western shoreline between the Dunn Memorial Bridge and the Corning Preserve boat launch.

For each specimen, the date of collection, a unique identification number or code, the station location (including coordinates), genus and species, total length in mm (to nearest mm), weight in grams (to nearest gram for adult fish and 0.1 grams for yearling pumpkinseed and forage fish), sex (done in the analytical laboratory during processing), and method of collection were recorded in the RAMP fish database. Measurements were made as soon as possible following collection, using calibrated instruments. Each sample was then wrapped in clean aluminum foil (shiny side out), placed in a labeled plastic resealable storage bag, and kept on ice following data processing. The same information was collected for composited fish, including number of individuals within the composite. Obvious external abnormalities were noted in the database. Chain-of-custody (COC) forms were generated after data were entered into the database and samples kept on ice and delivered by courier to the Pace laboratory in Schenectady, New York, for analysis. Samples were processed by experienced personnel at the laboratory, and prepared tissues (standard fillets or whole bodies) were frozen at a temperature below -18 degrees Celsius (°C) until analyzed. Fish samples were analyzed within the 1-year holding time.

### 2.3.4 Analytical Program

Fish preparation (filleting, scaling, skin removal from ictalurids, and sex determination) was conducted by Pace following NYSDEC protocols (NYSDEC Fish Preparation Procedures for Contaminant Analysis). Fish samples were analyzed by Pace for Total PCBs according to a modification of the EPA Method 8082 Aroclor Sum Method (Pace SOP NE148_08; Phase 2 RAM QAPP, Attachment A, Appendix A3-1).

Additionally, fish samples were analyzed by Pace to determine the lipid contents according to the methods outlined in Pace SOP NE158_05 (Phase 2 RAM QAPP, Attachment A, Appendix A3-3).

Prior to analysis, fish tissue, either whole body or fillet, was homogenized following the methods outlined in Pace SOP NE132_07 (Phase 2 RAM QAPP, Attachment A, Appendix A3-4). Extraction and cleanup of fish tissue were accomplished via Pace SOP NE017_09 (Phase 2 RAM QAPP, Attachment A, Appendix A3-5).

## 2.4 Submerged Aquatic Vegetation Sampling Program

Wild celery (*Vallisneria americana*), which is a notable type of SAV found in the Upper Hudson River, was collected from certain Phase 2 dredge areas on September 13, 2012, for chemical analysis. Specifically, wild celery plants were collected from CUs 55, 56, and 58, which are scheduled for dredging in 2013 (Figure 2-7). The collection and analysis of wild celery was conducted as part of an evaluation of additional plant sources for the habitat construction component of the Upper Hudson River dredging project. The following sections describe the sampling methods, analytical procedures, and results from the sampling program.

### 2.4.1 Sampling Methods

Wild celery was collected following the procedures in the *Standard Operating Procedure, Aquatic Plant Collection* (Anchor QEA 2012c).

Approximately 20 plants were collected from five discrete areas within each CU. A vessel navigated to a vegetated area within the CU and a location was recorded with Differential

Global Positioning System (DGPS). Sampling personnel then donned the appropriate personal protective equipment (PPE) and entered the water. Plants were dislodged by gently digging into the sediment. While underwater, they were moved back and forth to wash away visible sediment, to the extent possible. Plants were placed into plastic resealable bags and labeled with the CU number and date. When approximately 20 plants were collected from that area, sampling personnel and equipment relocated at least 10 feet away to collect another 20 plants. This continued until approximately 100 plants were collected from the CU. The above procedures were performed at each of the three CUs.

Following aquatic plant sample collection, plants were processed for submittal to the laboratory. Plants were removed from the resealable plastic bags and the aboveground and belowground portions of the plants were separated and placed into separate bags. Each bag was labeled with a CU number and date, and identified as either above-ground or below-ground. Samples were placed into a cooler with wet ice for shipment to the laboratory. A COC form was completed to accompany the shipment.

### *2.4.2 Analytical Program*

Aquatic plants were analyzed by Pace for Total PCBs using EPA Method 8082 Aroclor Sum Method (Pace SOP NE148_08; Phase 2 RAM QAPP, Attachment A, Appendix A3-1). Prior to analysis, samples were washed thoroughly in the laboratory to remove any remaining sediment from the plant material. Samples were also homogenized following the methods outlined in Pace SOP NE132_07 (Phase 2 RAM QAPP, Attachment A, Appendix A3-4). Extraction and cleanup of plant samples were accomplished via Pace SOP NE017_09 (Phase 2 RAM QAPP, Attachment A, Appendix A3-5).

# 3 QUALITY ASSURANCE/QUALITY CONTROL

## 3.1 Performance Evaluation Samples

### *3.1.1 Aqueous Performance Evaluation Samples*

GE submitted performance evaluation (PE) samples to Pace for both the 1-L and 8-L mGBM analyses of water samples in July 2012. The PE samples were prepared by Wibby Environmental (Wibby) and contained the same 64 congeners contained in the PE samples used in the independent verification of the mGBM validation at concentrations near the current laboratory control spike (LCS) levels of 198 nanograms per liter (ng/L) and 6 ng/L for the 1-L and 8-L mGBM analyses, respectively. The 64 congeners are representative of those typically encountered in Hudson River environmental samples. The laboratory summed the individual congener results on a homolog and total basis. An evaluation of the method performance was made based on acceptance limits of 70% to 130% for the individual IUPAC 4 and IUPAC 10 congeners, homolog, and Total PCB results as compared to the known values. Recoveries for the homologs and Total PCBs in both the 1-L and 8-L mGBM PE samples were within the 70% to 130% acceptance limits with the exception of a slightly low recovery for monochlorobiphenyl in the 1-L mGBM PE (68.6% as shown in Table 3-1). In addition, the recoveries for BZ 4 and BZ 10 in both the 1-L and 8-L mGBM PE samples were within the 70% to 130% acceptance limits (Table 3-2).

The following evaluations were made to investigate the low monochlorobiphenyl recovery in the 1-L mGBM PE:

- The initial calibration results suggest very good instrument linearity with a correlation coefficient of 0.9999 for Peak 2 (the only monochlorobiphenyl spiked in the mGBM PEs).
- The bracketing continuing calibration results suggest very good instrument stability with percent differences within -5% and -8% for Total PCBs and -11% and -14% for Peak 2 (slight low bias but within limits).
- The PE preparation log provided by Wibby does not reveal a documented spiking error.

The investigation did not reveal any laboratory error or documented spiking error during PE preparation that would result in the low monochlorobiphenyl recovery. The continuing calibration verifications (CCVs) showed a slight low bias for Peak 2 (approximately -13%) but well within QC limits. It is possible that additional monochlorobiphenyl was lost during sample extraction. The results of the 2012 PEs were similar to the 2011 PEs, which may indicate the limits are too tight for monochlorobiphenyl given the greater likelihood of loss due to volatilization for this PCB homolog. No corrective action is required.

Additional 1-L and 8-L mGBM PEs are anticipated early in the 2013 dredging season.

### *3.1.2 Sediment Performance Evaluation Samples*

The preparation of sediment PEs, generation of control limits, and implementation of the 2012 sediment PE program associated with the baseline surface sediment and downstream deposition studies were performed as described in the *2012 Supplemental Engineering Data Collection Sediment Sampling Data Summary Report* (Anchor QEA and ESI 2013). The PEs used and submitted during analysis of the sediment samples collected as part of the Baseline Surface Sediment and Downstream Deposition Study are listed in Table 3-3. PE25 and PE26 were each provided to the field team for submittal to the laboratory for the fall collection for the Downstream Deposition Study. The field database incorrectly listed the PE blind field identifications to be associated with PE20. The field team did not record which of these PEs was submitted in which week during the 2-week period of this study. Based on conversations with field personnel, it was assumed that these two PEs were submitted in sequential order (i.e., PE25 the first week and PE26 the second week). The control charts for the GEHR8082 Total PCB PE results associated with this special study in 2012 indicate that Pace remained in control (Figure 3-1). Specifically, the Total PCB results for these special study GEHR8082 PEs were within plus or minus two standard deviations of the mean, demonstrating that the results are accurate and comparable. Control charts for Aroclor 1221 (Figure 3-2) and Aroclor 1242 (Figure 3-3) also indicate that Pace accurately determined the individual Aroclor concentrations.

## 3.2 Field Quality Assurance/Quality Control

Field QA/QC samples were collected to allow evaluation of data quality. Field QA/QC samples for water column samples included equipment blank samples, blind duplicate samples, and matrix spike (MS) samples. Field QA/QC for sediment samples collected as part of the special study consisted of blind duplicate samples. Fish sampling field QA/QC samples were generated in the laboratory because fish sampling does not include the use of field QA/QC samples as part of the study design. Plant sampling does not include field QA/QC samples as this sampling was part of an evaluation not defined in the Phase 2 RAM QAPP. The types and frequency of field QA/QC checks and samples collected for each parameter are described below.

### *3.2.1 Remedial Action Monitoring Program Sampling*

#### *3.2.1.1 Far-field Station Quality Assurance/Quality Control Sampling*

Far-field station QA/QC testing was conducted in 2012 in accordance with the Phase 2 RAM QAPP. The sampling was conducted on a monthly basis from May through November 2012 to evaluate the performance of the automated far-field monitoring stations. This sampling involved the collection of paired manual and automated samples at the Lock 5 and Waterford far-field stations. Additionally, two rounds of QA/QC sampling were conducted at the Thompson Island station while it was in use for near-field monitoring. Both the manual and automated samples were collected in duplicate, and submitted for analysis of PCBs by the mGBM and for TSS analysis. The QA/QC sampling included the collection of manual samples from each intake location using procedures described in Section 2.1.2.2.1. Samples from the automated stations were collected from the stilling well using the ISCO sampler.

The results of this QA/QC testing are summarized in Table 3-4. Inconsistencies were observed in the data obtained during the October 2012 far-field QA/QC sampling (ESI 2013). PCB concentrations were generally elevated relative to the 24-hour far-field composite compliance samples collected in the same time period (October 26 through October 27, 2012), and several of the highest concentrations were reported at Waterford instead of Thompson Island or Lock 5. In addition, very poor precision (129% to 142%) was observed among the results of four of the six field duplicate pairs. Due to these discrepancies, a sample labeling error or sample switching among the various stations was suspected, and the far-

field QA/QC samples collected in October were flagged as "suspect" in the database, and have been excluded from Table 3-4.

#### *3.2.1.2 Water Sampling Instrument Calibration*

Continuous WQ measurements for temperature, specific-conductivity, pH, DO, and turbidity were performed at both the near-field and far-field monitoring stations throughout the 2012 dredging season and at buoys deployed at Stillwater throughout the duration of the Stillwater special study. These measurements were made using a YSI 6920 multi-parameter probe. The probe was calibrated in accordance with the manufacturer's recommendations prior to deployment. Once the probe was installed at a monitoring station, the instrument calibration was checked weekly by deploying a second calibrated instrument at the same approximate location (in the water column for buoy-based stations or stilling well for automated far-field stations) and performing an instantaneous comparison of the outputs. If the data were outside of the acceptable range (as specified in Appendix 2.3-3 of the Phase 2 RAM QAPP), the probe was re-calibrated or replaced with a calibrated instrument, as appropriate.

#### *3.2.1.3 Fish Sampling Instrument Calibration*

Balances used to weigh fish were calibrated each day prior to sampling. Calibration checks were recorded on a field log. A YSI 6920 WQ probe was used at each station. This probe was calibrated prior to use in accordance with the user manual. Equipment was maintained and repaired in accordance with manufacturer's specifications. In addition, prior to use, each major piece of equipment was cleaned, decontaminated, checked for damage, and repaired if needed. Field calibration activities were noted in a field log notebook or form.

#### *3.2.1.4 Equipment Blanks*

Equipment blanks were collected for PCB (Aroclor and/or mGBM) analysis once per group of up to 20 water samples obtained using manual sampling techniques at the far-field sampling stations (i.e., collected approximately monthly throughout the dredging season). Equipment blanks (i.e., filter blanks) were also collected weekly for analysis of dissolved metals (during the 4-week sampling period for metals), which met the Phase 2 RAM QAPP's required frequency of one per sample batch of up to 20 samples (i.e., rate of 5%). Equipment blanks

were collected at the rate of 5% of the total number of sediment samples or one per sample batch of up to 20 samples for the sediment special study programs. Equipment blanks were not collected during off-season monitoring.

With the exception of filter blanks for dissolved metals, equipment blanks in association with water samples were collected using dedicated automated sampling equipment at near-field and far-field stations. Specifically, equipment blanks for water sampling were collected using a representative clean, individual sample container used for sub-sample collection in accordance with the water column sample collection SOPs (Appendices 2.3-1, 2.3-2, and 2.4-1 of the Phase 2 RAM QAPP). Equipment blanks were not applicable to the TSS analysis.

Equipment blanks for fish tissue samples were not required in the approved Phase 2 RAM QAPP.

Equipment blanks for sediment samples analyzed for PCBs were prepared by processing a sample of clean, pre-tested sand in the same manner as environmental samples, including placement in sampling equipment, removal, mixing, and placing in containers.

#### *3.2.1.5 Field Duplicates*

Sample duplicates were collected in the field (co-located with the environmental sample) following sampling procedures detailed in the water column sample collection SOP (Appendices 2.3-1 and 2.4-1 of the Phase 2 RAM QAPP). These samples were submitted to the analytical laboratory "blind" without any indication of the actual sample location. Field duplicates were generally prepared at a rate of 5% or greater of the total number of environmental samples (at least one duplicate sample per batch of 20 samples) as specified in the Phase 2 RAM QAPP, with the exception of a field duplicate for total and dissolved metals and hardness analyses. Due to a sample collection error, a field duplicate was inadvertently not collected for total and dissolved metals and hardness in association with the near-field metals sampling program; however, a laboratory duplicate (LD) was analyzed once per week throughout the 4-week duration of the metals sampling program. Sediment field duplicates were prepared at the rate of 5% of the total number of environmental samples, and consisted of two aliquots of homogenized sediment. Because it is impossible to collect field duplicates

for fish samples, duplicates for fish were generated in the laboratory by splitting the homogenate.

#### *3.2.1.6 Laboratory Duplicates/Matrix Spikes/Matrix Spike Duplicates*

The water program included analysis of MS samples for metals and TOC (pre-dredging only) at a rate of one per sample batch (up to 20 samples), and analysis of LD samples for metals, TOC, and TSS at a rate of one per sample batch (up to 20 samples). Some of the sample batches for TSS did not include the required LD, but an overall rate of 5% was met. The water sampling program also included the analysis of MS samples for whole water PCBs (Aroclor and mGBM) at a minimum rate of 5% of the total number of environmental samples, as required by the Phase 2 RAM QAPP. In addition, the water program included the analysis of three matrix spike duplicates (MSDs) for PCBs by mGBM and 11 MSDs for Aroclor PCBs, as compared to the Phase 2 RAM QAPP-required rate of one per month.

MS/MSDs/LDs were analyzed at the rate of one pair per sample batch (up to 20 samples) for fish samples. Either MSD or LD analysis was performed on fish samples, but not both.

MSs, LDs, and/or MSDs were not required for the Aroclor PCB analysis on sediment samples (consistent with the Sediment Sampling and Analysis Plan, Phase 1 RAMP, and 2011 Phase 2 RAMP) because the sediment QC program used PE samples extensively as an accuracy monitoring measure, as described in Section 3.1.2; however, the laboratory did analyze two sediment MSs and one sediment LD for Aroclor PCBs. MSs and LDs for sediment samples were analyzed for TOC at a rate of 5% of the total number of environmental samples as required by the Phase 2 RAM QAPP. LDs for sediment samples were analyzed for moisture content at a rate of 5% of the total number of environmental samples, as required by the Phase 2 RAM QAPP.

## 3.3 Lab Quality Assurance/Quality Control

### *3.3.1 Method Blanks*

Method blanks were prepared and analyzed by the contract laboratories at a rate of at least one per analytical batch. Method blanks for water consisted of laboratory-prepared blank water that was processed along with the batch of environmental samples, including all

treatments performed on actual samples. Method blanks for sediment and fish consisted of sodium sulfate that was processed along with the batch of environmental samples, including all treatments performed on actual samples.

### *3.3.2 Laboratory Control Spikes*

LCSs were analyzed at the rate of one per sample batch (up to 20 samples). LCSs consisted of laboratory-fortified method blanks. The purpose of analyzing laboratory control samples is to demonstrate the accuracy of the analytical method.

### *3.3.3 Temperature Blanks*

A temperature blank was provided in each cooler sent from the laboratory to the field. The purpose of this sample was to document the temperature of the cooler upon arrival at the laboratory.

## 3.4 U.S. Environmental Protection Agency Split Samples

EPA did not collect split water or sediment samples during 2012. EPA has not obtained split homogenized fish tissue samples from the 2012 as of the date of this report.

## 3.5 Field and Laboratory Audits

Field audits of the near-field and far-field water column collection activities performed by Anchor QEA field personnel were conducted by ESI on May 14 through 16, 2012, and October 17, 2012. A field audit of 2012 fish collection activities performed by Anchor QEA field personnel was conducted by ESI on May 29, 2012. These audits were conducted as described in Section 11.1.2 of the Phase 2 RAM QAPP. The field audits indicated that the field crews conducted their work in a professional manner and complied with the procedures outlined in the Phase 2 RAM QAPP and applicable SOPs. Additionally, the field audits indicated that consistent sample collection and processing procedures were used during 2012. A few minor issues were identified during the audits and are discussed in the audit reports (Appendix B). The issues identified in the audit reports did not jeopardize the data quality objectives (DQOs) of the project. When possible, the recommendations were discussed with the field team at the time of occurrence. A debriefing meeting was held with Anchor QEA

field personnel at the conclusion of each audit. The field crews incorporated recommendations, as appropriate.

Laboratory audits were conducted by ESI personnel on May 14 through 16, 2012, for Pace (with respect to PCB and TSS analyses for water samples); on May 23, 2012, for Pace (with respect to PCB and TOC analyses for sediment samples); and on May 17, 2012 for Test America-Burlington (with respect to metals and hardness analyses for water samples and grain size analysis for sediment samples). The audits were conducted as described in Section 11.2.3 of the Phase 2 RAM QAPP and intended to provide feedback on laboratory operating issues with respect to method compliance, laboratory systems, and good laboratory practices.

The audit reports for the contract laboratories are included in Appendix B. The audits found that the laboratories were adhering to the project-specific methods and QA requirements.

## 3.6 Discontinuation of mGBM Bias Correction Factors

Throughout the BMP and Phase 1 water monitoring programs, correction factors were applied by Pace to the mGBM results to more accurately report the concentrations for IUPAC 4 and IUPAC 10 in DB-1 Peak 5, IUPAC 5 and IUPAC 8 in DB-1 Peak 8, and IUPAC 15 and IUPAC 18 in DB-1 Peak 14. The correction factors for DB-1 Peaks 5, 8, and 14 had been determined in 2003 for the BMP and in 2009 for the Phase 1 RAMP using the approach described in Development of Corrections for Analytical Biases in the 1991 to 1997 GE Hudson River PCB Database (HydroQual 1997). However, as directed by EPA, these correction factors were no longer used in the Phase 2 RAMP. Instead, the mGBM was updated to include a second column (CP-SIL5-C18) analysis for the dichlorobiphenyl congeners IUPAC 4 and IUPAC 10. The second column analysis was used for water samples analyzed by the mGBM to achieve a more accurate quantification for PCB congeners IUPAC 4 and IUPAC 10 (which coelute in mGBM Peak 5) by achieving full resolution and individual measurement for these two congeners. Correction factors were also no longer utilized for mGBM DB-1 Peaks 8 and 14 due to their relatively minor contribution to Total PCBs.

## 3.7 Data Management

Data collected under the water and fish sampling programs have been stored in electronic databases. Specialized application modules, outlined in the subsections below, were used to automate data collection, data evaluation, and data integration.

### *3.7.1 Field Sample Data Collection System*

The water monitoring programs consisted of collecting both field data from recording instruments and water samples for laboratory analysis. Field data and sample collection information were captured electronically in a field database designed to support the monitoring program. The field database application comprised electronic data entry forms and data export functions designed to ensure efficient and accurate data recording. Features included data entry fields with valid value selection lists to limit entry errors and automated data generation for field values based on user-entered information to limit transcription errors. Functions also included sample label and COC form generation capabilities for samples that were sent to laboratories for analysis. Further, these applications had procedures for electronic data deliverable (EDD) generation from field databases to facilitate accurate data import into the central RAMP database.

Probe-based WQ data collected from near- and far-field monitoring stations were recorded on data loggers and transmitted in real-time to the RAMP eDMS. Each station recorded temperature, turbidity, DO, specific conductivity, pH, geographic position, and battery voltage. Continuously monitored data received from the monitoring stations by the data management system were automatically checked for valid values before being stored in the eDMS database. If any of these data did not pass these checks, an error log was generated for review by designated data QC personnel.

For the fish sampling program, field-generated data were entered into a field database via custom-designed forms developed in Microsoft® Access. This custom application facilitated data entry and management of the collected field data for the project by capturing, managing, and maintaining field data, including electronic COC creation, sample identification creation, and sample label creation. These forms also limited the possibility of data entry/transcription errors by including valid value selection lists for certain required

fields. In addition, several data fields were populated automatically to further reduce data entry/transcription errors.

### 3.7.2 Laboratory Data Checker

Custom computer code was written to automate checking of the EDDs submitted by the analytical laboratory. EDDs submitted to the data management system were automatically checked for data reliability according to various criteria, including valid values, data types, and format, as described in the Phase 2 RAM QAPP. If errors were detected, the file was corrected by the laboratory prior to loading into the data management system.

### 3.7.3 Data Verification Module

Custom computer code was developed to facilitate data quality evaluation. An automated data verification module (DVM) verified analytical data submitted by the laboratory, reviewed data against the performance specifications provided for the project, produced exception reports, and loaded qualified results to the project database.

The term "verification" is used to designate the criteria-based checking of the laboratory-reported QC results against the limits defined in the Phase 2 RAM QAPP. This comparison was used to qualify the data, as necessary. Automated electronic data verification (EDV) was performed on 100% of the analytical results received using the batch QC results provided by the laboratories in the EDDs. The following specific measures were evaluated during verification and the associated criteria and are discussed in the Phase 2 RAM QAPP:

- Holding times
- Accuracy (by evaluating LCS and MS/MSD recoveries)
- Precision (by evaluating LD results)
- Field duplicate sample precision
- Blank contamination (laboratory method blanks and field generated blanks)
- Surrogate compound recoveries
- Percent solids

## 3.8 Data Validation

Electronic data verification and data validation (where necessary) were conducted after samples were collected and analyzed. The usability of the analytical data was assessed using a tiered approach. All data initially underwent an EDV, which provided the first test of the quality of the results. This automated process assessed data usability by evaluating batch QC results. (As noted above, the term "verification" is used because criteria-based checking of the laboratory reported QC results against the limits defined in the Phase 2 RAM QAPP was used to qualify data.)

Full validation (i.e., manual qualitative and quantitative checking) included an evaluation of documented QA/QC measures through a review of tabulated QC summary forms and raw instrument data. The validation results were also compared to the results of the electronic verification for the same set of data, which provided an indication of the accuracy of the electronic verification process. Verification and validation findings are discussed in Section 5.

### *3.8.1 Remedial Action Monitoring Program Water Data*

Section 12.2.2.2.1 of the Phase 2 RAM QAPP specifies that all data for the water column samples collected for PCBs (Aroclor and mGBM), metals, hardness, and TSS during the first week of dredging were to undergo full manual validation to provide a measure of data quality at the startup of the dredging season. In addition, that section states that approximately 50% of the data for the aforementioned analyses from the water column samples collected during the third week of the dredging season would undergo manual validation to provide a measure of data quality at the beginning of the season once the laboratories were in full operation and past any startup issues. Finally, that section provides that, starting with data collected during the fourth week of the dredging season, approximately 5% of the data for the aforementioned analyses would be validated each month to provide an ongoing measure of data quality throughout the dredging season.

As discussed in Phase 2 Corrective Action Memorandum (CAM) No. 1, dated November 30, 2012 (included in Appendix C), the manual data validation performed in 2011 did not reveal start-up issues and there had not been a change in the laboratories in 2012 because Pace and

TestAmerica Burlington were used for these analyses since the 2011 season. Therefore, it was concluded that the extra front-loaded data validation would not provide a significant benefit to the Phase 2 RAMP. As a result, with EPA approval, the up-front validation of early season data in 2012 was discontinued and 5% of the 2012 PCB data generated were validated to provide an ongoing measure of data quality. The overall percentage of data validated for the Phase 2 RAMP data included in this DSR for each analytical technique is presented in Table 3-5.

### *3.8.2 Special Study Sediment Data*

Approximately 5% of the sediment data analyzed for Aroclor PCBs and TOC were validated to provide an ongoing measure of data quality throughout the dredging season, including the special studies. As indicated in Table 3-5, no sediment samples from the Baseline Surface Sediment and Downstream Deposition Study were selected for manual data validation. However, the 5% validation goal was met for the Aroclor PCB analysis for all the sediment programs combined (i.e., the residual sediment sampling described in the Phase 2 RAM QAPP, the special study, and the supplemental engineering data collection (SEDC) sampling program. Percent moisture and grain size data were not validated, as stated in the Phase 2 RAM QAPP.

### *3.8.3 Fish Tissue Data*

Full data validation was performed on 5% of the PCB data (Aroclor PCBs) from fish tissue samples, as presented in Table 3-5. One of the first SDGs provided for the year was selected for validation in order to identify potential issues at the beginning of the season. Subsequent SDGs were selected randomly until the annual 5% validation goal was met.

## 3.9 Sample Archives

2012 RAMP sample extracts for PCB analysis and homogenized tissue from fish samples were held (frozen at less than -10 °C for extracts and less than -18 °C for fish tissue) as required by Section 10.1.3 of the Phase 2 RAM QAPP as follows:

| Sample/PCB Extract Matrix | Archive Time |
|---|---|
| Water Sample Extract | Until holding time is exceeded |
| Homogenized Fish Tissue | 1 year from collection |
| Fish Tissue Extract | 1 year from collection |

EPA will have the option of obtaining some or all of the 2012 archived sample extracts and homogenized fish tissue pursuant to the 2005 Remedial Action Consent Decree (RA CD) for this site.

# 4 RESULTS

## 4.1 Near-field Water Results

### *4.1.1 Polychlorinated Biphenyls*

A total of 431 environmental samples (409 environmental samples plus 22 duplicates) were analyzed for Aroclor PCBs. The results ranged from non-detect to 4,214 ng/L. Six environmental samples collected from the background location were analyzed for PCBs by the mGBM; results ranged from 3.43 to 13.1 ng/L. Summary statistics by station are presented in Table 4-1; these statistics do not include non-routine samples. The near-field PCB data are included in the database provided in Appendix A.

### *4.1.2 Metals and Hardness*

Dissolved and total metals and hardness samples were collected from the near-field transect for the first approximately 4 weeks of dredging activities. Four environmental samples were analyzed for total and dissolved Cd and Pb, and four environmental samples were analyzed for hardness. In accordance with the Phase 2 RAM QAPP, sampling for metals and hardness was discontinued after that initial period because results were significantly below the Aquatic Acute WQ Standards (as specified in Section 2.3.3 of the Phase 2 RAM QAPP). The results and summary statistics from these analyses were presented in a Technical Memorandum entitled *Results of Near-field Metals Analyses* (Anchor QEA 2012d), submitted to EPA in June 2012. Summary statistics of the total and dissolved metals data are presented in Table 4-2, and the data are included in Appendix A.

### *4.1.3 Total Suspended Solids*

A total of 437 samples (415 environmental samples plus 22 duplicates) were analyzed for TSS. Results ranged from non-detect to 47.3 mg/L. Summary statistics are presented in Table 4-1, and the data are included in Appendix A.

### *4.1.4 Water Quality Parameters*

Summary statistics of the near-field DO, turbidity, and pH measurements are presented in Table 4-3. Near-field WQ data are included in Appendix D.

## 4.2 Far-field Water Results

### *4.2.1 Polychlorinated Biphenyls*

A total of 504 routine samples (467 environmental samples plus 37 duplicates) were collected during the 2012 dredging season. Fifteen samples (13 environmental samples plus two duplicates) collected at Bakers Falls and Rogers Island were analyzed for PCBs by the mGBM. A total of 489 samples (454 environmental and 35 duplicates) were analyzed for Aroclor PCBs. Results ranged from non-detect to 780 ng/L. Summary statistics for routine samples by station are presented in Table 4-4, and the data are included in the database provided in Appendix A.

### *4.2.2 Total Suspended Solids*

A total of 504 samples (467 environmental samples plus 37 duplicates) were analyzed for TSS. Results ranged from non-detect to 205 mg/L. Summary statistics are presented in Table 4-4, and the data are included in Appendix A.

### *4.2.3 Water Quality Parameters*

Summary statistics for general WQ parameters, including DO, turbidity, pH, specific conductance, and water temperature, measured during far-field and off-season monitoring are presented in Table 4-5. Far-field WQ data are included in Appendix D.

## 4.3 Off-season Monitoring Results

Off-season sampling was conducted from January 2 through April 23, 2012, in accordance with the 2011 RAM QAPP, during which samples were analyzed for TSS, TOC, and PCBs by the mGBM. The program was reinitiated upon completion of the far-field monitoring program on November 29, 2012, and during this period samples were analyzed for TSS, Aroclor PCBs, and PCBs by the mGBM as described in the Phase 2 RAM QAPP.

### *4.3.1 Polychlorinated Biphenyls*

A total of 78 samples (74 environmental samples plus 4 duplicates) were analyzed for PCBs (Aroclor and mGBM). Results ranged from non-detect to 58.6 ng/L. Summary statistics by

station are presented in Table 4-4, and the data are included in the database provided in Appendix A.

### 4.3.2 Total Suspended Solids

A total of 78 samples (74 environmental samples plus 4 duplicates) were analyzed for TSS. Results ranged from non-detect to 17.6 mg/L. Summary statistics are presented in Table 4-4, and the data are included in Appendix A.

### 4.3.3 Total Organic Carbon

A total of 58 samples (55 environmental samples plus three duplicates) were analyzed for TOC. Results ranged from 3.30 to 6.62 mg/L. Summary statistics are presented in Table 4-4, and the data are included in Appendix A.

## 4.4 Special Study Results

### 4.4.1 Baseline Surface Sediment and Downstream Deposition

A total of 202 sediment samples were collected during the 2012 field sampling season—103 samples in the spring and 99 samples in the fall.[5] The samples collected in the spring and fall were composited into 49 and 50 samples, respectively (Phase 2 RAM QAPP; Figures 9.3-1a and 9.3-1b). The 99 composite samples were submitted for Aroclor PCB, TOC, and grain size analyses. The PCB Aroclor data were converted from Total PCBs to Tri+ PCBs using the regression equation in the Phase 2 RAM QAPP, Appendix 4.3-1.

#### 4.4.1.1 Polychlorinated Biphenyls

Total PCB results ranged from 1.27 to 672 mg/kg for the spring study and 0.87 to 61.4 mg/kg for the fall study. Tri+ PCB results ranged from 0.58 to 138 mg/kg for the spring study and 0.45 to 25.3 mg/kg for the fall study. Spring and fall Total PCB and Tri+ PCB results and summary statistics are provided in Tables 4-6 and 4-7, respectively. The spatial distribution of spring Total PCB and Tri+ PCB results is shown in Figures 4-1a through 4-1d, and the spatial distribution of fall Total PCB and Tri+ PCB results is shown in Figures 4-2a through

[5] Eleven locations were abandoned in the spring and four additional locations were abandoned in the fall.

4-2d. A comparison of spring and fall Total PCB and Tri+ PCBs results is presented in Figure 4-3.

#### *4.4.1.2 Total Organic Carbon*

Results for TOC ranged from 1,500 to 240,000 mg/kg for the spring study and 795 to 220,000 mg/kg for the fall study. Spring and fall TOC results and summary statistics are provided in Tables 4-6 and 4-7, respectively.

#### *4.4.1.3 Grain Size*

Average grain size composition for the spring study was 4% clay, 20% silt, 70% sand (fine, medium, and coarse), and 5% gravel. Average grain size composition for the fall study was 5% clay, 20% silt, 69% sand, and 6% gravel. Spring and fall grain size results and summary statistics are provided in Tables 4-6 and 4-7, respectively.

### *4.4.2 Stillwater Buoy-based Far-field Station*

The results of the Stillwater Buoy-based Far-field Station Study are included in the December 13, 2012 Technical Memorandum entitled *Evaluation of Buoy-based Far-field Station at Stillwater* (Appendix E).

## 4.5 Fish Program Results

### *4.5.1 Polychlorinated Biphenyls*

A total of 642 fish samples were collected from the Hudson River during the 2012 field sampling season (467 samples in the spring and 175 samples in the fall) and submitted for Aroclor PCB analysis. The fish sampling program dataset is provided in the RAMP fish database (Appendix F), and the results are summarized below.

#### *4.5.1.1 Black Bass*

Aroclor PCBs were detected in 138 of 145 black bass samples (including largemouth bass and smallmouth bass; Table 4-8, Figure 4-4).

#### *4.5.1.2 Ictalurids*

Aroclor PCBs were detected in 131 of 145 ictalurid samples (including brown bullhead, yellow bullhead, white catfish, and channel catfish; Table 4-9, Figure 4-5).

#### *4.5.1.3 Perch*

Aroclor PCBs were detected in 109 of 125 perch samples (including yellow perch and white perch; Table 4-10, Figure 4-6).

#### *4.5.1.4 Striped Bass*

Aroclor PCBs were detected in 51 of 52 samples of striped bass (Table 4-11, Figure 4-7).

#### *4.5.1.5 Pumpkinseed*

Aroclor PCBs were detected in 105 of 125 pumpkinseed samples (Table 4-12, Figure 4-8).

#### *4.5.1.6 Forage Fish*

Aroclor PCBs were detected in 45 of 50 forage fish (spottail shiner, golden shiner, fallfish, bluntnose minnow, and mimic shiner) sample composites (Table 4-13, Figure 4-9).

### *4.5.2 Lipids*

Percent lipid was measured in all 642 fish samples using Method NE158_05. Summary statistics of the results, by Hudson River pool, are provided in Tables 4-14 (black bass fillets), 4-15 (ictalurid fillets), 4-16 (perch fillets), 4-17 (striped bass fillets), 4-18 (pumpkinseed whole-body samples), and 4-19 (forage fish composites). The lipid results are included in the fish dataset presented in the RAMP fish database (Appendix F).

### *4.5.3 Sex*

Fish sex was determined for each individual of the 467 fish samples collected in spring 2012. Results for fish sex are presented in this section by species. Summary statistics are included in tables for each species by Hudson River pool. The fish sex results are included in the fish dataset presented in the 2012 RAMP fish database (Appendix F).

#### 4.5.3.1 Black Bass

Fish sex was determined in 144 black bass (largemouth bass and smallmouth bass) to be 72 males and 72 females (Table 4-20).

#### 4.5.3.2 Ictalurids

Fish sex was determined in 139 ictalurids (brown bullhead, yellow bullhead, channel catfish, and white catfish) to be 71 males and 68 females (Table 4-21).

#### 4.5.3.3 Perch

Fish sex was determined in 93 perch (yellow perch and white perch) to be 55 males and 38 females (Table 4-22).

#### 4.5.3.4 Striped Bass

Fish sex was determined in 52 striped bass samples collected from the Lower Hudson River stations (Albany/Troy, Catskill, and Tappan Zee), with the results showing 12 males and 40 females (Table 4-23).[6]

### 4.5.4 Fish Field Observations

Fish condition was assessed using field measurements and observations. Observed external abnormalities were recorded to assess fish condition. Of the species examined, ictalurids appeared to have the greatest number of external abnormalities.

Abnormalities were observed in fish collected from the reference area (Feeder Dam Pool). Several smallmouth bass had blackspot and two had a leech attached to a fin. One largemouth bass had blackspot, one had parasites in the soft dorsal fin, and one had part of the left pectoral fin missing. Some yellow perch had blackspot and several had white spot or a white parasite at the base of the caudal fin. The ictalurids had abnormalities such as

[6] Attempts were made to collect an even number of males and females from Albany/Troy by gently squeezing the fish along the flanks to see if eggs or milt were extruded by the females or males, respectively. This effort was unsuccessful. As confirmed in the laboratory, 12 females and 8 males were sampled at Albany/Troy.

melanoma, lesions, burned or missing barbels, wounds, and fin erosion. Three pumpkinseeds had blackspot.

In the Thompson Island Pool, abnormalities observed in smallmouth bass included blackspot, an eroded pectoral fin, and one fish with an abrasion and a leech on the left pectoral fin. Of the largemouth bass, one had a hook wound and one had caudal fin erosion. Yellow perch abnormalities included blackspot, caudal fin erosion, and leeches attached to the caudal fins. Fin erosion, broken spines, lesions, abrasions, burned or missing barbels, leeches, split dorsal fins, melanoma, and various wounds were observed in the ictalurid group. Pumpkinseeds had blackspot and leeches attached to various fins.

In the Northumberland/Fort Miller Pool, blackspot was observed in many of the black bass, along with some hook wounds and fin erosion. Several yellow perch exhibited fin erosion and blackspot. Two yellow perch had a leech attached and two had a parasite at the base of the caudal fin. Ictalurids had a combination of lesions, fin erosion, melanoma, wounds, missing whiskers and barbels, abrasions, and broken spines. Several pumpkinseeds had blackspot and two had a leech attached.

In the Stillwater Pool, many of the smallmouth bass and yellow perch were observed with blackspot. Several smallmouth bass and yellow perch also had leeches attached. Ictalurids were observed to have wounds, lesions, tumors, broken spines, melanoma, and burned or missing barbels. Three pumpkinseeds had blackspot.

In the Albany/Troy Pool, several smallmouth bass had blackspot and one largemouth bass had a wound on the lower jaw. One white perch had a wound above the left pectoral fin. Ictalurids had missing or burned barbels, missing whiskers, melanoma, broken spines, and one had a bad eye and two leeches attached. One striped bass had a wound on the ventral side and one had lesions on the right side. One pumpkinseed was missing the tip of the caudal fin.

At the Catskill location, black bass abnormalities included blackspot, hook wounds, and forage fish in the gullets. Ictalurids had red spots on the ventral side and burned barbels. For

the striped bass, one fish had a regenerated caudal fin and one had damage to the head caused by the propeller from the electrofishing vessel.

At the Tappan Zee location, one striped bass had a worm attached to the ventral side, two had fin erosion, one had a fungus, and one appeared to have wounds from a bird on its side.

The weight and total length of captured fish were measured to assess fish condition. Condition index was determined using the following equation:

$$Condition\ Index(K) = \frac{Weight(g) * 100{,}000}{Length(mm)^3}$$

A condition index of 1.0 indicates a fish of normal condition. A condition index greater than 1.0 indicates a fish of better than average condition.

Black bass, ictalurids, perch, striped bass, and pumpkinseed captured from all five pools during the 2012 fish sampling program had an average condition index greater than 1.0 (Figures 4-10 through 4-14, respectively) except for the channel catfish at Albany/Troy and striped bass at Tappan Zee, which had condition indices of 0.93 and 0.98, respectively. Forage fish captured during the 2012 fish sampling program had an average condition index less than 1.0 at all of the stations, ranging from 0.76 to 0.94 (Figure 4-15).

## 4.6 Submerged Aquatic Vegetation Program Results

Approximately 300 aquatic plants (100 per CU) were collected from CUs 55, 56, and 58 during the 2012 field sampling season. Six samples were submitted to the laboratory for PCB analysis. These samples consisted of three above-ground samples (1 per CU) and three below-ground samples (1 per CU) with each sample containing approximately 100 aquatic plants. Aroclor PCBs were detected in each sample at concentrations ranging from 0.128 to 0.470 mg/kg (Table 4-24).

## 4.7 Laboratory Analytical Data Packages

Electronic copies of the laboratory hardcopy data packages for water, fish, special study sediment, and SAV data are included in Appendix G.

# 5 DATA QUALITY

## 5.1 Performance Evaluation Program

Aqueous PE samples were submitted to Pace for the 1-L and 8-L mGBM analyses as required by Section 11.2.1.1 of the Phase 2 RAM QAPP. In addition, sediment PE samples were submitted to Pace for Aroclor PCB analysis by GEHR8082 as required by Section 11.2.1.2 of the Phase 2 RAM QAPP. The results of the PE sample analyses were described in Section 3.1.

## 5.2 Validation/Verification

Electronic data verification and data validation of the analytical results were conducted as described in Section 3.8 to provide an understanding of the analytical data quality. The number of 2012 samples manually validated for each method and program is described in Section 3.8. Additionally, Appendix H provides a listing of each 2012 sample that was validated for each program, method, and laboratory. Appendix I provides copies of the six data validation reports prepared for each group of 2012 sample data that were validated. These appendices provide the specific details of the data qualification resulting from the validation process.

Validation qualifier codes were placed next to the results in the GE analytical databases so that data users can quickly assess the qualitative and/or quantitative reliability of any result. The analytical database was then used to generate tabulated reports (data tables) of the validation results and qualifier codes. The final validated results for each dataset are presented as data tables in each data validation report included in Appendix I.

The same qualifier codes were used for both the data verification and validation processes. The qualifier codes and definitions used for the data were as follows:

- "Null": No qualifier code. The compound was detected and should be considered quantitatively and qualitatively valid based on the QC review.
- U: The compound/analyte was analyzed for, but was non-detect above the reported sample detection limit.

- <J: The sum of the positive PCB congener peaks for the sample is greater than zero but is below the sample-specific Total PCB method detection limit (MDL). Quantitation is approximate (estimated).
- U* (RAMP fish) or UB (RAMP water or sediment): This compound/analyte should be considered "non-detect" because it was detected in a blank at a similar level.
- J: Quantitation is approximate (estimated) due to limitations identified during the QA review (or data validation).
- N: The analysis indicates that there is presumptive evidence to make a "tentative identification" of this compound/analyte.
- R: Unusable (rejected) result. The compound/analyte may or may not be present in this sample.
- UR: Unusable "non-detect" result. The compound may or may not be present in this sample.
- UJ: This compound/analyte was non-detect, but the quantitation/detection limit is probably higher than reported due to a low bias identified during the QC review.
- S: The result should be considered suspect (e.g., where disparate data indicate sampling or analytical error).

The validation qualifier code field of the GE analytical database was queried to provide a tabulation of the number of results for each analysis fraction that were valid as reported (unqualified results and non-detected results U and, for Total PCBs only, <J), and those that were qualified with each qualifier code identified above. The percent usable and unusable data and the percent completeness were calculated for each analysis fraction according to the following equations:

| | | |
|---|---|---|
| % Usable Data | = | Unqualified Positive Results + #U (+#<J for Total PCBs) + #U*/UB + #J +#JN + #UJ/Total Number of Results |
| % Unusable Data | = | #R + #UR/Total Number of Results |
| % Completeness | = | Valid Data as Reported [Unqualified Positive Results + #U]/[Total Number of Results – positive results <RL - <J] |

The percent completeness calculation does not include results qualified as estimated values ("J") due to being below the sample-specific reporting limit (RL) but above the MDL, or Total

PCB results qualified as <J for being above zero but below the sample-specific MDL. These results are not included in the completeness calculation because they are estimated values pursuant to standard EPA analytical data reporting conventions.

A summary of the data quality for the individual analytical fractions is presented in the following sections. The data quality has been described based on the percent completeness and percent usable results as follows:

| Qualitative Data Quality | Percent Completeness | Percent Usable |
|---|---|---|
| Excellent | 95% | 100% |
| Very Good | 85% | 95% |
| Good | 75% | 90% |
| Above Average | 65% | 85% |
| Average | 45% | 80% |
| Poor | <45% | <80% |

The percent completeness goal stated in the Phase 2 RAM QAPP is 95%. The above Qualitative Data Quality (QDQ) index was based on professional judgment and experience. It was developed to provide a qualitative framework to discuss the data quality. Although the description of data quality has been based on criteria for both the percent completeness and percent usable data calculations, the percent usable data calculation is a more critical reflection of the data quality than the percent completeness calculation. Percent completeness reflects the percentage of the data that satisfied all of the DQOs (i.e., the percentage of unqualified data), whereas percent usability reflects the percentage of the data that has some qualitative and/or quantitative use, which is inclusive of the data that satisfied all of the DQOs. The results of the percent completeness calculation do not indicate the nature of the qualification of the "incomplete" data. The data that are usable but qualitatively or quantitatively qualified may have no impact on the end use of the data, depending on what decisions need to be made based on those data. In other words, data that have low percent completeness may still be "100% usable" for decision-making purposes.

The following example calculations are provided based on the percent completeness, percent unusable, and percent usable data presented in Table 5-1 for RAMP Aroclor PCBs in water NE273_02) and following the explanations in Notes 6, 7, and 8:

1. Percent Completeness is the sum of results that were valid as reported [Unqualified Positive Results + U]/[Total Number of Results - J[4] - <J[3]].
   Ex. 94.7% = [(1,275 + 5,193)/(7,104 –272- 0)]*100
2. Percent Unusable Data is the sum of the results qualified R + UR/Total Number of Results.
   Ex. 0.1% = [(0 + 8)/7,104]*100
3. Percent Usable Data is the sum of the Unqualified Positive Results + U [+<J[3] for Total PCBs] + UB + J + JN + UJ/Total Number of Results.
   Ex. 99.9% = [(1,275 + 5,193 + 0 + 0 + 491 + 0 + 137)/7,104]*100

### *5.2.1 Data Verification and Validation Results for Water Samples*

The overall data quality for the water sample data is very good and the vast majority of the results are usable (Table 5-1). The percent usable data, percent unusable data, and percent completeness for the entire water dataset are 99.97%, 0.03%, and 84.9%, respectively.

A comparison of the validation results to the results of the electronic verification was performed during the manual validation in order to provide an indication of the accuracy of the EDV process. The following issues were identified during this comparison for the EDV process used for the 2012 Phase 2 RAMP water dataset.

- The EDV process did not include an evaluation of equipment blank results associated with the samples collected for the near-field and far-field water monitoring programs. As specified in the Phase 2 RAM QAPP (Section 10.2.1.2), collection of equipment blanks was limited to samples collected for mGBM and Aroclor PCBs using non-automated sampling equipment (far-field water samples collected at the manual sampling locations) and filter blanks for samples collected for dissolved metals. With the exception of filter blanks for dissolved metals, equipment blanks were not required for water samples collected using dedicated, automated sampling equipment at near-field and far-field stations (used at Lock 5 and Waterford) because representative equipment blanks cannot be collected using these types of sampling equipment. Evaluation of the equipment blank results could result in additional qualification of select data as "UB" in manually collected samples (i.e., these results

should be considered "non-detect" because the analyte was detected in a blank at a similar level).

- The EDV process did not include an evaluation of the "Calibration Compliant" field as planned by the Phase 2 RAM QAPP (Section 12.2.1). A separate query was performed on the database to identify any instances when the calibration associated with a result was reported to be non-compliant. The query did not identify any instances of non-compliant calibrations for the data included in this DSR.
- The EDV process evaluated holding times based on both dates and hour of the day instead of just dates for holding times expressed in units of days. For example, a sample analyzed for TSS on the seventh day after collection should be considered to be within the holding time of 7 days of collection regardless of the time of day that the sample was collected and analyzed. However, the EDV process qualified results as estimated if the sample was analyzed for TSS on the seventh day but at an hour of the day that was later than the hour of day that the sample was collected.
- The EDV process did not qualify the results between the sample-specific MDL and RL as estimated ("J") when the results were flagged "JB" (for presence in the associated method blank in addition to the quantitation below the RL) by the laboratory.

#### *5.2.1.1 Data Verification and Validation Results for Polychlorinated Biphenyls by mGBM*

The data quality for the water samples for PCBs analyzed by the mGBM (using SOPs NE294_00 and NE293_00) is good (Table 5-1). The percent usable data, percent unusable data, and percent completeness for the entire mGBM PCB dataset are 100%, 0%, and 81.9%, respectively. None of the mGBM PCB data were qualified as unusable.

The DVM used to verify the PCB analytical data tracks the reason(s) that sample results are qualified for the individual assessment measures (e.g., holding times). The GE database was queried to determine why those data were qualified. However, results from manual validation are not tracked in the GE analytical database; thus, the validation reports were also evaluated manually. This combined assessment indicated that the EDV process identified the primary QC measures that resulted in qualification of data, as listed below:

- **Blank contamination**. Positive sample results that exhibited PCB concentrations similar to that in the equipment and method blanks were qualified as "non-detect" and flagged "UB." Qualification due to blank contamination occurred for approximately 14% of the mGBM PCB dataset. Equipment blank contamination was only evaluated during manual data validation. Qualification as "UB" solely due to equipment blank contamination occurred for 0.2% of the manually validated PCB sample results.
- **Low LCS recovery**. Water sample results associated with LCS recoveries outside of acceptance criteria (60% to 140%) resulted in qualification of positive and "non-detect" results as estimated "J" and "UJ," respectively, for approximately 1.2% of the mGBM PCB dataset (two samples).
- **Field duplicate precision**. Water sample results associated with original and field duplicate samples that did not meet the project field duplicate precision criteria resulted in qualification of positive and "non-detect" results as estimated "J" and "UJ," respectively, for approximately 0.6% of the mGBM PCB dataset. A more detailed discussion on field duplicate results is presented in Section 5.3.
- **Total PCB results summed from estimated individual congener results**. The Total PCB results in all samples were qualified as estimated because at least one of the individual congener results that were summed to calculate the Total PCB result was qualified as estimated.
- **Surrogate recoveries outside of acceptance criteria**. Water sample results associated with surrogate recoveries outside of acceptance criteria (60% to 140%) resulted in qualification of one "non-detect" PCB congener result as estimated ("UJ"). Samples analyzed at a dilution factor of greater than five were not evaluated for surrogate recovery because the surrogate compounds are diluted out of the sample. The percentage of 2012 samples analyzed for PCB congeners with a dilution factor greater than five was 1.8%.
- **Exceeded calibration range**. One result in one sample (0.1% of the validated PCB congener results) was qualified as estimated ("J") that had a concentration that was above the instrument calibration range during manual data validation.

As the above list indicates, qualification of the mGBM PCB data for QC reasons occurred most often due to blank contamination. In addition to the reasons listed above,

approximately 13% of the data were qualified as estimated "J" due to the standard EPA analytical data reporting convention of qualifying data as estimated when they fall between the RL and the MDL.

#### *5.2.1.2 Data Verification and Validation Results for Aroclor Polychlorinated Biphenyls*

The data quality for the water samples for Aroclor PCBs analyzed by SOP NE273_02 is excellent (Table 5-1). The percent usable data, percent unusable data, and percent completeness for the entire Aroclor PCB dataset are 99.9%, 0.1%, and 94.7%, respectively. Eight results in the Aroclor PCB dataset (Aroclors and total PCBs for one sample) were qualified as unusable.

As noted above, the DVM used to verify the PCB analytical data tracks the reason(s) that sample results are qualified for the individual assessment measures. The GE database was queried to determine why those data were qualified. However, because results from manual validation are not tracked in the GE analytical database, the validation reports were also evaluated manually. This combined assessment indicated that the EDV process identified the primary QC measures that resulted in qualification of data, as follows:

- **Total PCB results summed from estimated individual Aroclor results**. The Total PCB results in 49% of the samples (6.2% of the results) were qualified as estimated because at least one of the individual Aroclor results that were summed to calculate the Total PCB result was qualified as estimated.
- **Surrogate recoveries outside of acceptance criteria**. Water sample results associated with surrogate recoveries outside of acceptance criteria (70% to 130%) resulted in qualification of positive and "non-detect" results as estimated "J" and "UJ," respectively, for approximately 1.5% of the Aroclor PCB data. Samples analyzed at a dilution factor of greater than five are not evaluated for surrogate recovery because the surrogate compounds are diluted out of the sample. The percentage of 2012 samples analyzed for Aroclor PCBs with a dilution factor greater than five was 0.1%.
- **Low LCS recovery**. Water sample results associated with LCS recoveries outside of acceptance criteria (70% to 130%) resulted in qualification of positive and "non-

detect" results as estimated "J" and "UJ," respectively, for approximately 1.2% (11 samples) of the Aroclor PCB dataset.

- **Low surrogate recovery.** The not-detected results for all Aroclors and Total PCBs in one sample (0.1% of the results) were qualified as unusable ("UR") because an unknown amount of sample extract spilled out of the sample vial due to a rinse cycle malfunction during extraction. This malfunction caused low surrogate recoveries. Although the surrogate recoveries were not quite low enough for the EDV process to flag the results "UR" (both greater than 10%), the results were qualified as unusable because "non-detect" results are not typical for this sample location.
- **Field duplicate precision**. Water sample results associated with original and field duplicate samples that did not meet the project field duplicate precision criteria resulted in qualification of positive and "non-detect" results as estimated "J" and "UJ," respectively, for approximately 0.1% of the Aroclor PCB dataset. A more detailed discussion on field duplicate results is presented in Section 5.3.

As the above list indicates, qualification of data for QC reasons occurred primarily due to out-of-criteria surrogate recoveries and low LCS recovery. In addition to these reasons, approximately 3.8% of the data were qualified as estimated "J" due to the standard EPA analytical data reporting convention of qualifying data as estimated when they fall between the RL and the MDL. Furthermore, full manual data validation revealed one near-field monitoring sample in which the laboratory missed reporting a positive result for Aroclor 1242 in addition to the reported positive results Aroclor 1221. The laboratory issued a revised EDD to update the Aroclor 1242 and Total PCB results in this sample based on the validation findings.

#### *5.2.1.3 Data Verification and Validation Results for Other Parameters*

The data quality for total metals and dissolved metals by EPA Method 200.8 is good and average, respectively (Table 5-1). The percent usable data, percent unusable data, and percent completeness for the total metals by EPA Method 200.8 dataset are 100%, 0%, and 78.6%, respectively. The percent usable data, percent unusable data, and percent completeness for the dissolved metals by EPA Method 200.8 dataset are 100%, 0%, and 57.1%, respectively. The queries of the GE database and manual evaluation of the data

validation reports revealed that metals sample results were qualified for the following reasons:

- **Blank contamination**. Qualification of trace-level positive results as "UB," due to equipment/filter, method, or calibration blank contamination occurred for 21% of the total and dissolved metals sample results (13% of the total metals results and 38% of the dissolved metals results). Equipment/filter and calibration blank contamination was only evaluated during manual data validation. Qualification as "UB" solely due to equipment/filter or calibration blank contamination occurred for 50% of the manually validated dissolved metal results (one result in one sample).
- **LCS recoveries outside of acceptance criteria**. Water sample results associated with LCS recoveries outside of acceptance criteria (85% to 115%) resulted in qualification of one positive total metals result as estimated "J" (6.3% of the data).

The low percent completeness for dissolved metals is primarily due to the fact that the trace-level positive results were qualified due to blank contamination. Qualification of total metals data also occurred primarily due to blank contamination of trace-level results. In addition to the above-listed reasons, approximately 13% of the total and dissolved metals by EPA 200.8 data were qualified as estimated "J" pursuant to the standard EPA analytical data reporting convention of qualifying data as estimated that fall between the RL and the MDL.

The data quality analyzed for hardness by SM 2340B is excellent (Table 5-1). The percent usable data, percent unusable data, and percent completeness for the hardness dataset are 100%, 0%, and 100%, respectively. None of the data were qualified.

The data quality for TSS by SM 2540D is above average (Table 5-1). The percent usable data, percent unusable data, and percent completeness for the TSS dataset are 100%, 0%, and 68.2%, respectively. None of the TSS data were qualified as unusable. The queries of the GE database and manual evaluation of the data validation reports revealed that TSS sample results were qualified for the following reasons:

- **Laboratory replicate precision**. Water sample results associated with original and laboratory replicate samples that did not meet the project laboratory's replicate

precision criteria resulted in qualification of positive results as estimated "J" and "non-detected" results as estimated "UJ" for approximately 23% of the TSS sample results.

- **LCS recoveries outside of acceptance criteria**. Water sample results associated with LCS recoveries outside of acceptance criteria (85% to 115%) resulted in qualification of positive and "non-detect" results as estimated "J" and "UJ," respectively, for approximately 4.4% of the TSS sample results.
- **Field duplicate precision**. Qualification of positive results as estimated "J" and "non-detected" results as estimated "UJ" due to field duplicate imprecision occurred for approximately 4.1% of the TSS sample results. A more detailed discussion on field duplicate results is presented in Section 5.3.
- **Blank contamination**. Positive sample results that exhibited PCB concentrations similar to that in the method blanks were qualified as "non-detect" and flagged "UB." Qualification due to blank contamination occurred for approximately 2.1% of the TSS dataset.
- **Exceeded holding times**. Qualification of positive results as estimated "J" and "non-detected" results as estimated "UJ" due to the TSS analysis being performed beyond the 7-day holding time from collection to analysis occurred for approximately 1.5% of the TSS sample results; however, as noted previously, the EDV process evaluated holding times based on both dates and hour of the day instead of just dates for holding times expressed in units of days. The TSS analyses were actually performed within the required holding time.

As shown by the above list, qualification of TSS data occurred primarily due to laboratory replicate and field duplicate imprecision and LCS recoveries outside of acceptance criteria.

The data quality for TOC by SM 5310B is excellent (Table 5-1). The percent usable data, percent unusable data, and percent completeness for the TOC dataset are 100%, 0%, and 100%, respectively. None of the TOC data were qualified.

### *5.2.2 Data Verification and Validation Results for Fish Tissue Samples*

The overall data quality for the fish tissue sample data is excellent, and all of the results are excellent (Table 5-2). The percent usable data, percent unusable data, and percent

completeness for the entire fish tissue dataset are 100%, 0%, and 99.3%, respectively. None of the fish data were qualified as unusable.

A comparison of the validation results to the results of the electronic verification was performed during the manual validation in order to provide an indication of the accuracy of the EDV process. One issue was identified during this comparison, which relates to the Total PCB results calculated from Aroclor PCBs: the EDV process did not qualify the reported positive results for Total PCBs summed from estimated Aroclor results as estimated ("J") when Aroclor results were qualified as estimated solely due to quantitation below the RLs. The impact of this issue is expected to be minimal because Total PCB results were qualified as estimated ("J") if the Total PCB result was less than its RL.

#### *5.2.2.1 Data Verification and Validation Results for Polychlorinated Biphenyls as Aroclors*

The data quality for Aroclor PCBs in fish tissue analyzed by Method NE148_08 (identified as NE148_04 in the database) is excellent (Table 5-2). The percent usable data, percent unusable data, and percent completeness for the entire Aroclor PCB dataset are 100%, 0%, and 99.3%, respectively. None of the data were qualified as unusable.

As discussed above for the water samples, the DVM used to verify the PCB analytical data tracks the reason(s) that sample results are qualified for the individual assessment measures. The GE database was queried to determine why those data were qualified. However, because results from manual validation are not tracked in the GE analytical database, the validation reports were also evaluated manually. This combined assessment indicated that the EDV process identified the primary QC measures that resulted in qualification of data, as listed below:

- **Surrogate recoveries outside of acceptance criteria**. Fish tissue sample results associated with surrogate recoveries outside of acceptance criteria (60% to 140%) resulted in qualification of positive and "not-detected" results as estimated "J" and "UJ," respectively, for approximately 0.25% of the Aroclor PCB data. Samples analyzed at a dilution factor of greater than five were not evaluated for surrogate recovery because the surrogate compounds are diluted out of the sample. The

percentage of 2012 samples analyzed for Aroclor PCBs with a dilution factor greater than five was 2.8%.

- **Laboratory replicate imprecision**. Fish tissue sample results associated with original and laboratory replicate samples that did not meet the project laboratory's replicate precision criteria resulted in qualification of a positive result as estimated "J" for approximately 0.3% of the sample results.
- **MS recoveries outside of criteria**. Fish tissue sample results associated with MS recoveries outside of acceptance criteria (70% to 130%) resulted in qualification of positive results as estimated "J" for approximately 0.1% of the Aroclor PCB data.

As the above list indicates, qualification of Aroclor PCB data as estimated "J" or "UJ" for QC reasons occurred in only a small portion of the data. In addition to these reasons, approximately 3% of the data were qualified as estimated "J" due to the standard EPA analytical data reporting convention of qualifying data as estimated when they fall between the RL and the MDL.

#### *5.2.2.2 Data Verification and Validation Results for Lipid Content*

The data quality for the fish tissue sample lipids content analyzed by NE158_05 (identified as NE158_03 in the database) is excellent (Table 5-2). The percent usable data, percent unusable data, and percent completeness for the entire lipid content dataset are 100%, 0%, and 99.1%, respectively. None of the data were qualified as unusable. The queries of the GE database revealed that a small percentage of the lipid content sample results were qualified as estimated "J" due to laboratory replicate imprecision. Specifically, approximately 0.9% of the sample results were qualified as estimated "J" because the sample results associated with original and laboratory replicate samples did not meet the project laboratory's replicate precision criteria.

### *5.2.3 Data Verification and Validation Results for Special Study Sediment Samples*

The overall data quality for the sediment sample data is very good, and all of the results are usable (Table 5-3). The percent usable data, percent unusable data, and percent

completeness for the entire special study sediment dataset are 100%, 0%, and 84.6%, respectively. None of the sediment data were qualified as unusable.

A comparison of the validation results to the results of the electronic verification was performed during the manual validation in order to provide an indication of the accuracy of the EDV process. One issue was identified during this comparison: the EDV process did not include an evaluation of the "Calibration Compliant" field as planned by the Phase 2 RAM QAPP (Section 12.2.1). A separate query was performed on the database to identify any instances when the calibration associated with a result was reported to be non-compliant. The query did not identify any instances of non-compliant calibrations for the data included in this DSR.

#### *5.2.3.1 Data Verification and Validation Results for Polychlorinated Biphenyls as Aroclors*

The data quality for PCBs as Aroclors in special study sediment analyzed by SOP GEHR8082 is very good (Table 5-3). The percent usable data, percent unusable data, and percent completeness for the entire PCBs as Aroclors dataset are 100%, 0%, and 87.9%, respectively. None of the data were qualified as unusable.

A query of the GE analytical database to determine the reasons that these PCB data were qualified, supplemented by a manual review of the data validation reports, indicated that the primary QC measures that resulted in qualification of data, as identified by the EDV process, were as follows:

- **Low percent solids**. Sediment samples that had less than 50% solids resulted in qualification of positive results and detection limits as estimated, "J" and "UJ," respectively, in accordance with EPA Region 2 validation criteria. Positive results and detection limits are reported on a dry-weight basis for the sediment samples to reflect the solids content of the samples; however, GE complied with the EPA Region 2 guidance to qualify sediment sample results with less than 50% solids. Approximately 10% of the sample results were qualified as "J" or "UJ" due to low percent solids.

- **Total PCB results summed from estimated individual Aroclor results**. The Total PCB results in 14% of the samples (1.7% of the results) were qualified as estimated because at least one of the individual Aroclor results that were summed to calculate the Total PCB result was qualified as estimated.
- **MS recoveries outside of acceptance criteria**. Sediment sample results associated with MS recoveries outside of acceptance criteria (50% to 150%) resulted in qualification of positive and "non-detect" results as estimated "J" and "UJ," respectively, for approximately 1.0% of the Aroclor PCB sample results. It should be noted that MS samples were not required for Aroclor PCB analysis of sediment samples.
- **Field duplicate precision**. Positive results or detection limits were qualified as estimated "J" or "UJ," respectively, for the original and field duplicate sediment samples that did not meet the project field duplicate precision criteria. Qualification from field duplicate imprecision occurred for 0.5% of the sample results. A more detailed discussion on field duplicate results is presented in Section 5.3.
- **Laboratory replicate precision**. Sediment sample results associated with original and laboratory replicate samples that did not meet the project laboratory's replicate precision criteria resulted in qualification of positive results as estimated "J" and "non-detected" results as estimated "UJ" for approximately 0.3% of the Aroclor PCB sample results. It should be noted that laboratory replicate samples were not required for Aroclor PCB analysis of sediment samples.

As the above list indicates, qualification of data as estimated ("J" or "UJ") for QC reasons occurred most often due to low percent solids. The percent solids of the samples cannot be controlled. Sediment sample results associated with surrogate recoveries outside of acceptance criteria (60% to 140%) also resulted in qualification of a small number of positive and "non-detect" results as estimated "J" and "UJ," respectively. Samples analyzed at a dilution factor of greater than five were not evaluated for surrogate recovery because the surrogate compounds are diluted out of the sample. The percentage of 2012 samples analyzed for PCBs as Aroclors with a dilution factor greater than five was 29%.

#### *5.2.3.2 Data Verification and Validation Results for Total Organic Carbon*

The data quality for the TOC analyzed by the Lloyd Kahn method is average (Table 5-3). The percent usable data, percent unusable data, and percent completeness for the entire TOC dataset are 100%, 0%, and 58.3%, respectively. None of the data were qualified as unusable. The queries of the GE database revealed that the TOC sample results were qualified for the following reasons:

- **Laboratory replicate imprecision**. Sediment sample results associated with original and laboratory replicate samples that did not meet the project laboratory's replicate precision criteria resulted in qualification of positive and "not-detected" results as estimated "J" and "UJ," respectively, for approximately 19% of the TOC samples results.
- **MS recoveries outside of acceptance criteria**. Sediment sample results associated with MS recoveries outside of acceptance criteria (75% to 125%) resulted in qualification of positive results as estimated "J" for approximately 11% of the TOC sample results.
- **Low percent solids**. Sediment samples that had less than 50% solids resulted in qualification of positive results and detection limits as estimated "J" and "UJ," respectively, in accordance with EPA Region 2 validation criteria. Positive results and RLs are reported on a dry-weight basis for the sediment samples to reflect the solids content of the samples; however, GE complied with the EPA Region 2 guidance to qualify sediment sample results with less than 50% solids. Approximately 10% of the sample results were qualified as "J" or "UJ" due to low percent solids.
- **Field duplicate precision**. Positive results or detection limits were qualified as estimated "J" or "UJ," respectively, for the original and field duplicate sediment samples that did not meet the project field duplicate precision criteria. Qualification from field duplicate precision occurred for 6.3% of the TOC sample results. A more detailed discussion on field duplicate results is presented in Section 5.3.

As the above list indicates, the most frequent reason for qualification of some of these TOC data as estimated "J" was laboratory replicate imprecision, although a relatively small number of the results were also qualified for other QC reasons.

## 5.3 Field Duplicates

Water and sediment field duplicates were generally prepared in the field for the Phase 2 RAMP at the rate of 5% of the total number of environmental samples or one per sample batch of up to 20 samples (refer to Section 3.2.1.2 for the specific frequency for each method). Fish tissue and SAV field duplicates were not submitted for analysis because it is impossible to collect field duplicates for fish and vegetation samples.

The precision criteria for field duplicate pairs are presented in Section 10.3.1 of the Phase 2 RAM QAPP. For water field duplicate pairs where both results were greater than or equal to five times the RL, the precision criterion is that the relative percent difference (RPD) between the results should be less than or equal to 35% for PCBs (Aroclor and mGBM), and less than or equal to 20% for all other parameters. For sediment field duplicate pairs where both results were greater than or equal to five times the RL, the precision criterion is that the RPD between the results should be less than or equal to 40% for all parameters. For water field duplicate pairs where at least one of the results was less than five times the RL (including when one result was a non-detect), the precision criterion is that the difference between the results should be less than or equal to the RL. For sediment field duplicate pairs where at least one of the results was less than five times the RL (including when one result was a non-detect), the precision criterion is that the difference between the results should be less than or equal to two times the RL. A value of half the RL was used for non-detect results in the difference calculation. If the analyte was not detected in the sample or the field duplicate sample, the RPD was not calculated and a quantitative evaluation was not made because neither sample had a positive result.

### *5.3.1 Aqueous Field Duplicate Results for Polychlorinated Biphenyls*

A summary of the field duplicate results for RAMP water samples analyzed for PCBs by the mGBM (using SOPs NE294_00 or NE294_00A and NE293_00) is presented in Table 5-4. A summary of the field duplicate results for water samples analyzed for Aroclor PCBs by NE273_02 is presented in Table 5-5. The tables each include the following information:

- The total number of field duplicate pairs is presented in the column with the heading "Total No. Field Duplicate Pairs." The table presents the total number of field

duplicate pairs for each analyte as well as the total number of field duplicate result pairs.

- The total number of the field duplicate pairs that had non-detect results in both the parent sample and field duplicate is presented in the column with the heading "Total No. Field Duplicate Pairs with NDs for Both Samples" (all of these met field duplicate precision criteria because both results are "non-detect"). This information is also presented by analyte.
- The total number of the field duplicate pairs that had positive results in the field duplicate and/or parent sample is presented in the columns under the heading "Total No. Field Duplicate Pairs with Positives in Either Sample." The total number ("Total No."), the number that met criteria ("No. Meet Criteria") and that did not meet criteria ("No. Do Not Meet Criteria"), as well as the percentages that met criteria ("% Meet Criteria") and did not meet criteria ("% Do Not Meet Criteria"), are presented. This information is also presented by analyte.
- The overall percentage of results that met criteria is presented in the column with the heading "Overall % Meet Criteria." This information is also presented by analyte.

A total of 35 whole water field duplicate pairs were analyzed for PCBs by the mGBM (using NE294_00 or NE294_00A and NE293_00). A high percentage (97%) of the results met the field duplicate precision criteria. For Total PCBs, 97% of the results met the field duplicate precision criteria. For the individual PCB congeners, the percentage of results that met the field duplicate precision criteria ranged from 66% to 100%. The percentage of field duplicate pairs with positive results in either sample that met the field duplicate precision criteria was 92% for all analytes and 97% for Total PCBs.

A total of 59 field duplicate pairs were analyzed for Aroclor PCBs by NE273_02). Of these results, 99% met the field duplicate precision criteria. For Total PCBs, 95% of the results met the field duplicate precision criteria. For the individual PCB Aroclors, the percentage of results that met the field duplicate precision criteria ranged from 98% to 100%. The percentage of field duplicate pairs with positive results in either sample that met the field duplicate precision criteria was 97% for all analytes and 95% for Total PCBs.

### 5.3.2 Aqueous Field Duplicate Results for Other Parameters

A summary of the RAMP field duplicate results for water samples analyzed for TOC and TSS by Methods SM 5310B and SM 2540D is presented in Table 5-6. The table includes, for each parameter/method, the same information described in Section 5.3.1 for Table 5-5.

Very good precision was demonstrated by the field duplicate pair results for TOC (Table 5-6). A total of three field duplicate pairs were analyzed for TOC and 100% of the results met the field duplicate precision criteria. A total of 96 field duplicate pairs were analyzed for TSS and 57% of the results met field duplicate precision criteria.

### 5.3.3 Sediment Field Duplicate Results for Aroclor Polychlorinated Biphenyls

A summary of the field duplicate results for the Baseline Surface Sediment and Downstream Deposition Study sediment samples analyzed for Aroclor PCBs by SOP GEHR8082 is presented in Table 5-7. The tables each include the same information described in Section 5.3.1 for Table 5-5.

A total of nine sediment field duplicate pairs were analyzed for Aroclor PCB by SOP GEHR8082. A high percentage (94%) of the results met the field duplicate precision criteria. For Total PCBs, 89% of the results met the field duplicate precision criteria. For the individual Aroclors, the percentage of results that met the field duplicate precision criteria ranged from 78% to 100%. The percentage of field duplicate pairs with positive results in either sample that met the field duplicate precision criteria was 86% for all analytes and 89% for Total PCBs.

### 5.3.4 Sediment Field Duplicate Results for Other Parameters

A summary of the field duplicate results for special study sediment samples analyzed for TOC and moisture content is presented in Table 5-8. The table includes, for each parameter, the same information described in Section 5.3.1 for Table 5-5.

Poor precision was demonstrated by the field duplicate pair results for TOC (Table 5-8). A total of nine field duplicate pairs were analyzed for TOC and only 33% of the results met the field duplicate precision criteria. Better precision was demonstrated for moisture content. A

total of nine field duplicate pairs were analyzed for moisture content and 78% of the results met field duplicate precision criteria.

## 5.4 Equipment Blanks

Equipment blanks were collected for water and special study sediment samples at the frequencies described in Section 3.2.1.4 to monitor the potential for external contamination during sample collection. As previously indicated, equipment blanks were not collected for fish tissue or plant samples.

As discussed in Section 3.2.1.4, the collection of aqueous equipment blanks in the 2012 water sampling program was limited to samples collected for mGBM and Aroclor PCB analyses using non-automated sampling equipment (far-field water samples collected at the manual sampling locations) and to filter equipment blanks for dissolved metals regardless of the initial sampling technique (i.e., manual or automated). Summary statistics for the results from the 2012 aqueous equipment blanks with analyte positive results greater than the MDL are presented in Table 5-9.

None of the seven aqueous equipment blanks collected for Aroclor PCB analysis in association with the manual far-field sampling locations had positive results for Aroclors or Total PCBs. None of the five aqueous equipment blanks collected for PCB analysis by the mGBM (NE294_00 and NE293_00) in association with the manual far-field sampling locations had a Total PCB concentration above the MDL. Trace concentrations of PCBs were detected in the whole water equipment blanks (Table 5-9). All four of the filter blanks collected for dissolved metals had trace-level positive results for dissolved lead (Table 5-9).

The impacts of the 2012 aqueous equipment blanks were not assessed during the EDV process (as noted in Section 5.2.1); however, the impacts of some of those aqueous equipment blank concentrations were assessed during the manual data validation processes and affected sample results qualified as "UB." Evaluation of the remaining equipment blank results could result in additional qualification of some data in manually collected samples as "UB." Based on the manual validation, the sample results with the greatest potential for impact from additional blank evaluation would be dissolved metals results.

For the special study sediment samples, equipment blanks were collected for the samples submitted for analyses of Aroclor PCBs and TOC. None of the seven sediment equipment blanks had positive results for Aroclor PCBs or TOC.

# 6 REFERENCES


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# TABLES

**Table 2-1**
**Near-field Sample Collection, Handling, and Analysis Summary**

| Analyte | Container Specifications | Preservation | Analytical Method | Turnaround Time[1] | | |
|---|---|---|---|---|---|---|
| | | | | Routine Sampling | Metals Exceedance Sampling | Holding Time[2] |
| Aroclor PCBs | 1-L amber glass | Cool, 4°C +/- 2°C | EPA 508 | 72 hours | NA | 365 days to extraction, 40 days to analysis |
| Low-level mGBM PCBs | 2-L to 4-L amber glass | Cool, 4°C +/- 2°C | Low MDL mGBM | Standard | NA | 365 days to extraction, 40 days to analysis |
| TSS | 1-L HDPE plastic bottle | Cool, 4°C +/- 2°C | SM 2540D[3] | 24 hours | NA | 7 days |
| Total cadmium (Cd), lead (Pb) | 500-mL HDPE plastic bottle (no liner) | $HNO_3$ to pH <2 | EPA 200.8 | 72 hours | NA | 180 days |
| Dissolved cadmium (Cd), lead (Pb) | 500-mL HDPE plastic bottle (no liner) | Field filter, $HNO_3$ to pH <2 | EPA 200.8 | 72 hours | NA | 180 days |
| Hardness | (from total Cd, Pb container) | -- | SM 2340B | 72 hours | 24 hours | 180 days |
| Total TAL metals | 500-mL HDPE plastic bottle (no liner) | $HNO_3$ to pH <2 | EPA 200.8 | NA | 24 hours | 180 days |
| Dissolved TAL metals | 500-mL HDPE plastic bottle (no liner) | Field filter, $HNO_3$ to pH <2 | EPA 200.8 | NA | 24 hours | 180 days |
| Total mercury | 1-L HDPE plastic bottle (no liner) | $HNO_3$ to pH <2 | EPA 245.1 | NA | 24 hours | 28 days |
| Dissolved mercury | 1-L HDPE plastic bottle (no liner) | Field filter, $HNO_3$ to pH <2 | EPA 245.1 | NA | 24 hours | 28 days |
| Total chromium (hexavalent) | 250-mL HDPE plastic bottle (no liner) | Cool, 4°C +/- 2°C | SW-846 7196A | NA | 24 hours | 24 hours |
| Dissolved chromium (hexavalent) | 250-mL HDPE plastic bottle (no liner) | Field filter, cool, 4°C +/- 2°C | SW-846 7196A | NA | 24 hours | 24 hours |

Notes:
1. All turnaround times run from time of verified time of sample receipt.
2. Holding times start on the date of collection.
3. Modified to be consistent with American Society for Testing and Materials (ASTM) Method D3977-97.

°C = degrees Celsius
EPA = U.S. Environmental Protection Agency
HDPE = high-density polyethylene
$HNO_3$ = nitric acid
L = liter
MDL = method detection limit
mGBM = Modified Green Bay Method
mL = milliliter
NA = not analyzed
PCB = polychlorinated biphenyl
TAL = target analyte list
TSS = total suspended solid

**Table 2-2**
**Far-field Sample Collection, Handling, and Analysis Summary**

| Station | Analyte | Container Specifications | Preservation | Analytical Method | Turnaround Time[1] | | Holding Time[2] |
|---|---|---|---|---|---|---|---|
| | | | | | Routine | Contingency | |
| Bakers Falls | Low-level mGBM PCBs | 2-L to 4-L amber glass bottles | Cool, 4°C +/- 2°C | Low MDL mGBM | Standard | NA | 365 days to extraction, 40 days to analysis |
| | TSS | 1-L HDPE plastic bottle | Cool, 4°C +/- 2°C | SM 2540D[3] | Standard | NA | 7 days |
| Rogers Island | Low-level mGBM PCBs | 2-L to 4-L amber glass bottles | Cool, 4°C +/- 2°C | Low MDL mGBM | Standard | NA | 365 days to extraction, 40 days to analysis |
| | TSS | 1-L HDPE plastic bottle | Cool, 4°C +/- 2°C | SM 2540D[3] | Standard | NA | 7 days |
| Lock 5 | Aroclor PCBs | 1-L amber glass bottle | Cool, 4°C +/- 2°C | Modified EPA 508 | 24 hours | NA | 365 days to extraction, 40 days to analysis |
| | mGBM PCBs[4] | NA - performed on Aroclor PCB extract | Cool, 4°C +/- 2°C | mGBM | Standard | NA | 365 days to extraction, 40 days to analysis |
| | mGBM PCBs[5] | 1-L amber glass bottle | Cool, 4°C +/- 2°C | mGBM | Standard | NA | 365 days to extraction, 40 days to analysis |
| | TSS | 1-L HDPE plastic bottle | Cool, 4°C +/- 2°C | SM 2540D[3] | 24 hours | NA | 7 days |
| Stillwater | Aroclor PCBs | 1-L amber glass bottle | Cool, 4°C +/- 2°C | Modified EPA 508 | Standard | NA | 365 days to extraction, 40 days to analysis |
| | mGBM PCBs[4] | NA - performed on Aroclor PCB extract | Cool, 4°C +/- 2°C | mGBM | Standard | NA | 365 days to extraction, 40 days to analysis |
| | TSS | 1-L HDPE plastic bottle | Cool, 4°C +/- 2°C | SM 2540D[3] | Standard | NA | 7 days |

**Table 2-2**
**Far-field Sample Collection, Handling, and Analysis Summary**

| Station | Analyte | Container Specifications | Preservation | Analytical Method | Turnaround Time[1] | | Holding Time[2] |
|---|---|---|---|---|---|---|---|
| | | | | | Routine | Contingency | |
| Waterford | Aroclor PCBs | 1-L amber glass bottle | Cool, 4°C +/- 2°C | Modified EPA 508 | 72 hours | NA | 365 days to extraction, 40 days to analysis |
| | mGBM PCBs[4] | NA - performed on Aroclor PCB extract | Cool, 4°C +/- 2°C | mGBM | Standard | NA | 365 days to extraction, 40 days to analysis |
| | mGBM PCBs[5] | 1-L amber glass bottle | Cool, 4°C +/- 2°C | mGBM | Standard | NA | 365 days to extraction, 40 days to analysis |
| | TSS | 1-L HDPE plastic bottle | Cool, 4°C +/- 2°C | SM 2540D[3] | 72 hours | NA | 7 days |
| Albany, Poughkeepsie | Aroclor PCBs | 1-L amber glass bottle | Cool, 4°C +/- 2°C | Modified EPA 508 | Standard | 24 hours | 365 days to extraction, 40 days to analysis |
| | TSS | 1-L HDPE plastic bottle | Cool, 4°C +/- 2°C | SM 2540D[3] | Standard | 24 hours | 7 days |

Notes:

1. All turnaround times (TATs) run from verified time of sample receipt at laboratory; standard TAT is 20 business days.
2. Holding times start on the date of collection.
3. Modified to be consistent with American Society for Testing and Materials (ASTM) Method 3977-
4. Aroclor PCB extract was selected monthly for mGBM PCB analysis.
5. Samples to be analyzed for mGBM PCBs were collected as part of the far-field station quality assurance/quality control sampling.

°C = degrees Celsius
EPA = U.S. Environmental Protection Agency
HDPE = high-density polyethylene
L = liter
MDL = method detection limit
mGBM = Modified Green Bay Method
NA = not analyzed
PCB = polychlorinated biphenyl
TSS = total suspended solids

**Table 2-3**
**Off-season Water Sample Collection, Handling, and Analysis Summary**

| Station | Analyte | Container Specifications | Preservation | Analytical Method | Turnaround Time[1] | Holding Time[2] |
|---|---|---|---|---|---|---|
| Bakers Falls | Low-level mGBM PCBs | 2-L to 4-L amber glass bottles | Cool, 4°C +/- 2°C | Low MDL mGBM | Standard | 365 days to extraction, 40 days to analysis |
| | TOC[3] | 40-mL VOA vial with 0.5-inch headspace | 1:1 HCl to pH<2, Cool, 4°C +/- 2°C | SM 5310B | Standard | 28 days |
| | TSS | 1-L HDPE plastic bottle | Cool, 4°C +/- 2°C | SM 2540D[4] | Standard | 7 days |
| Rogers Island | Low-level mGBM PCBs | 2-L to 4-L amber glass bottles | Cool, 4°C +/- 2°C | Low MDL mGBM | Standard | 365 days to extraction, 40 days to analysis |
| | TOC[3] | 40-mL VOA vial with 0.5-inch headspace | 1:1 HCl to pH<2, Cool, 4°C +/- 2°C | SM 5310B | Standard | 28 days |
| | TSS | 1-L HDPE plastic bottle | Cool, 4°C +/- 2°C | SM 2540D[4] | Standard | 7 days |
| Thompson Island, Schuylerville, Waterford | Aroclor PCBs[5] | 1-L amber glass bottle | Cool, 4°C +/- 2°C | Modified EPA 508 | Standard | 365 days to extraction, 40 days to analysis |
| | mGBM PCBs[6] | 1-L amber glass bottle | Cool, 4°C +/- 2°C | mGBM | Standard | 365 days to extraction, 40 days to analysis |
| | TOC[3] | 40-mL VOA vial with 0.5-inch headspace | 1:1 HCl to pH<2, Cool, 4°C +/- 2°C | SM 5310B | Standard | 28 days |
| | TSS | 1-L HDPE plastic bottle | Cool, 4°C +/- 2°C | SM 2540D[4] | Standard | 7 days |
| Albany, Poughkeepsie | Aroclor PCBs[5] | 1-L amber glass bottle | Cool, 4°C +/- 2°C | Modified EPA 508 | Standard | 365 days to extraction, 40 days to analysis |
| | mGBM PCBs[6] | 1-L amber glass bottle | Cool, 4°C +/- 2°C | mGBM | Standard | 365 days to extraction, 40 days to analysis |
| | TOC[3] | 40-mL VOA vial with 0.5-inch headspace | 1:1 HCl to pH<2, Cool, 4°C +/- 2°C | SM 5310B | Standard | 28 days |
| | TSS | 1-L HDPE plastic bottle | Cool, 4°C +/- 2°C | SM 2540D[4] | Standard | 7 days |

Notes:
1. Turnaround times (TATs) from verified time of sample receipt at laboratory. Standard TAT is 20 business days.
2. Holding time starts on the date of collection.
3. Total organic carbon analyses were only performed in the pre-dredging off season.
4. Modified to be consistent with American Society for Testing and Materials (ASTM) Method D3977-97.
5. Aroclor PCB analyses were performed for the post-dredging off season.
6. The mGBM congener analyses were only performed in the pre-dredging off season.

Acronyms:
°C = degrees Celsius
EPA = U.S. Environmental Protection Agency
HCl = hydrochloric acid
HDPE = high-density polyethylene
L = liter
MDL = method detection limit
mGBM = Modified Green Bay method
PCB = polychlorinated biphenyl
TOC = total organic carbon
TSS = total suspended solids
VOA = volatile organic analysis

**Table 2-4**

**Fish RAMP Sampling Locations and Number of Each Species Per Location (2012 Spring Sampling)**

| Location | | Site Code | SMB/LMB *Size (TL)* >305 mm | BB/YB CHC/WHC >200 mm | YP/WP >170 mm/>160 mm | Striped Bass >450 mm | Total | Sample Date | Shocking Seconds | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| Feeder Dam | | FD1 | 20 | 20 | 20 | | **60** | 5/23/2012 | 6086 | Sampled at cove downstream from launch, and near power plant and large wetland upstream. |
| **Feeder Dam Totals** | | | ***20*** | ***20*** | ***20*** | | ***60*** | | | |
| Upstream | Thompson Island Pool | TD1 | 5 | 3 | 1 | | **9** | 5/22/2012 | 6117 | Sampled entire area around Rogers Island – little habitat for bullhead and perch. |
| | Thompson Island Pool | TD2 | 2 | 3 | 0 | | **5** | 5/22/2012 | 1929 | Sampled both eastern and western shorelines of site; limited habitat due to dredging in CU19. |
| | Thompson Island Pool | TD3 | 5 | 5 | 5 | | **15** | 5/22/2012 | 3136 | Sampled around three sisters – lower island where bullhead and perch collected; bass collected on western shoreline of river from Snook Kill upstream across from upper island. |
| | Thompson Island Pool | TD4 | 8 | 0 | 11 | | **19** | 5/22/2012 | 2227 | Sampled entire site – from culvert downstream to cove on western shore – no bullhead observed; additional perch and bass collected to make up for shortage at other sites. |
| Downstream | Thompson Island Pool* | TD5 | 10 | 19 | 13 | | **42** | 5/22/2012 | 1328 | Sampled behind Griffin Island along western shoreline; additional perch and bullhead collected to make up for shortage at other sites. |
| **Thompson Island Pool Totals** | | | ***30*** | ***30*** | ***30*** | | ***90*** | | | |
| Upstream | Ft. Miller/Northumberland Pools (LL section) | ND1 | 5 | 10 | 7 | | **22** | 5/23/2012<br>5/25/2012 | 6079 | Sampled western shore of Thompson Island, downstream on eastern shore of smaller island, and along eastern shore of river across from boat launch on 5/23; additional bullhead collected for ND2 shortage – 4,356 shocking seconds. Sampled along western shore of island on 5/25 for two perch to account for shortage at ND1 – 1,723 shocking seconds. |
| | Ft. Miller/Northumberland Pools (LL section) | ND2 | 5 | 0 | 3 | | **8** | 5/23/2012<br>5/25/2012 | | Sampled entire site on 5/23; no bullhead observed and only two perch collected – 2,750 shocking seconds. Sampled entire area again on 5/25; one additional perch collected, one bullhead observed but could not be collected – 1,614 shocking seconds. |
| | Ft. Miller/Northumberland Pools | ND3 | 5 | 5 | 5 | | **15** | 5/24/2012 | 1128 | Sampled below the rapids and in cove downstream on eastern shoreline. |
| Downstream | Ft. Miller/Northumberland Pools | ND5 | 10 | 10 | 10 | | **30** | 5/25/2012 | 3799 | Sampled cove on eastern shore, along eastern shore upstream from bridge, around island, and along western shore near launch area. |
| **Ft. Miller/Northumberland Pools Totals** | | | ***25*** | ***25*** | ***25*** | | ***75*** | | | |
| Upstream | Stillwater Pool | SW1 | 5 | 5 | 5 | | **15** | 5/24/2012 | 5730 | Sampled around Lock 5 and western shoreline from lock to boat launch, eastern shoreline from boat ramp to mouth of Battenkill – final bullhead tough to find. |
| | Stillwater Pool | SW2 | 5 | 5 | 5 | | **15** | 5/24/2012 | 3237 | Sampled along eastern shoreline of entire site, perch difficult to find; sampled along western shoreline for perch. |
| | Stillwater Pool** | SW3 | 10 | 10 | 14 | | **34** | 5/24/2012<br>5/30/2012 | 2105 | Sampled along both shorelines in cove on 5/24 and collect all targeted fish – 1,493 shocking seconds. Sampled cove on 5/30 to collect additional perch to make up for shortage at other locations – 612 shocking seconds. |
| | Stillwater Pool | SW4 | 5 | 5 | 4 | | **14** | 5/29/2012<br>5/30/2012 | 5887 | Sampled along western shore on 5/29, collect three bass before thunderstorms hit – 852 shocking seconds. On 5/30, sampled entire site along western shore (three times), as well as eastern shore, yellow perch tough to find – still one short, remaining bass and bullhead collected – 5,035 shocking seconds. |
| Downstream | Stillwater Pool | SW5 | 5 | 5 | 2 | | **12** | 5/29/2012<br>5/30/2012 | 10611 | Sampled entire area from Lock 6 upstream to cove on eastern shoreline and western shoreline; still short four perch – 4,230 shocking seconds; second attempt after thunderstorms – 339 shocking seconds. Sampled entire area again on 5/30 for missing perch – one collected – 6,042 shocking seconds. |
| **Stillwater Pool Totals** | | | ***30*** | ***30*** | ***30*** | | ***90*** | | | |
| | Albany/Troy | AT1 | 20 | 20 | 20 | 20 | **80** | 5/21/2012<br>5/30/2012 | 10830 | Sampled below dam, entire shoreline of island with boat launch, and along eastern shore of river across from launch on 5/21 – 8,818 shocking seconds. Sampled below dam and along eastern shore of island on 5/30 for eight additional catfish – 2,012 shocking seconds. |
| | **Albany/Troy Totals** | | ***20*** | ***20*** | ***20*** | ***20*** | ***80*** | | | |

**Table 2-4**

**Fish RAMP Sampling Locations and Number of Each Species Per Location (2012 Spring Sampling)**

| Location | | Site Code | SMB/LMB *Size (TL) >305 mm* Actual Number of Adult Fish | BB/YB CHC/WHC *>200 mm* Actual Number of Adult Fish | YP/WP *>170 mm/>160 mm* Actual Number of Adult Fish | Striped Bass *>450 mm* Actual Number of Adult Fish | Total | Sample Date | Shocking Seconds | Comments |
|---|---|---|---|---|---|---|---|---|---|---|
| | Catskill | CS | 20 | 20 | | 20 | **60** | 4/24/2012<br>5/21/2012 | 12903 | Sampled along western shore from boat launch to approximately half-mile upstream of RVW bridge; 8,083 shocking seconds on 4/17; 4,820 shocking seconds on 5/21 (collected 17 bullhead and 17 black bass) from mouth of Catskill Creek and western shoreline from launch to RVW bridge. |
| | **Catskill Totals** | | ***20*** | ***20*** | | ***20*** | ***60*** | | | |
| | Tappan Zee | TZ | | | | 12 | **12** | 4/17/2012<br>5/2/2012 | | Gillnetting on 4/17 collected eight stripers with ten 2-hour net sets;<br>charter fishing on 5/2 catch of four stripers in 6.5 hours |
| **Tappan Zee Totals** | | | | | | ***12*** | ***12*** | | | |

Notes:

*Historical New York State Department of Environmental Conservation (NYSDEC) location behind Griffin Island

**Historical NYSDEC location near Coveville

BB = Black Bass, CHC = Channel Catfish, LMB = Large Mouth Bass SMB = Small Mouth Bass, WHC = White Catfish, YB = Yellow Bullhead, YP = Yellow Perch, WP = White Perch

mm = millimeter

RVW = Rip Van Winkle

TL = Total Length

YP/WP = equal numbers of each at Albany/Troy (10 of each) when possible

**Table 2-5**
**Fish RAMP Sampling Locations and Number of Each Species per Location (2012 Fall Sampling)**

| Location | | Site Code | PSKD *70-130 mm* Number of Fish[2] | STS[1] Number of Fish[2] | Total | Sample Date | Shocking Seconds | Site Description | Notes |
|---|---|---|---|---|---|---|---|---|---|
| Feeder Dam | | FD1 | 20 | 10 | **30** | 9/5/2012 | 3376 | Feeder Dam pool near boat launch | |
| **Feeder Dam Total** | | | ***20*** | ***10*** | ***30*** | | | | |
| Upstream | Thompson Island Pool | TD1 | 5 | 2 | **7** | 9/4/2012 | 974 | Near Rogers Island | |
| | Thompson Island Pool | TD2 | 5 | 2 | **7** | 9/4/2012 | 551 | Near RM 193 | |
| | Thompson Island Pool | TD3 | 5 | 2 | **7** | 9/4/2012 | 1038 | Just upstream of Snook Kill – behind three sisters islands on eastern shore | Dredged spring 2012 |
| | Thompson Island Pool | TD4 | 5 | 2 | **7** | 9/4/2012 | 1388 | Northern end of Griffin Island | |
| Downstream | Thompson Island Pool* | TD5 | 10 | 2 | **12** | 9/4/2012 | 2152 | Near RM 190 – along eastern shoreline | |
| **Thompson Island Pool Totals** | | | ***30*** | ***10*** | ***40*** | | | | |
| Upstream | Ft. Miller/Northumberland Pools (LL section) | ND1 | 3 | 2 | **5** | 9/4/2012 | 6452 | From Thompson Island to small island below | Sample entire area; still short 2 PKSD |
| | Ft. Miller/Northumberland Pools (LL section) | ND2 | 5 | 2 | **7** | 9/4/2012 | 1780 | Downstream end of pool | |
| | Ft. Miller/Northumberland Pools | ND3 | 7 | 2 | **9** | 9/5/2012 | 2662 | Below Fort Miller dam to two small islands | |
| | Ft. Miller/Northumberland Pools | ND4 | | | **0** | 9/5/2012 | | Abandoned | |
| Downstream | Ft. Miller/Northumberland Pools | ND5 | 10 | 4 | **14** | 9/5/2012 | 1656 | Wetland area above Northumberland Dam | |
| **Ft. Miller/Northumberland Pools Totals** | | | ***25*** | ***10*** | ***35*** | | | | |
| Upstream | Stillwater Pool | SW1 | 5 | 2 | **7** | 9/5/2012 | 1640 | Below Battenkill | |
| | Stillwater Pool | SW2 | 5 | 2 | **7** | 9/5/2012 | 1080 | Approximately 0.75 mile upstream of Coveville | |
| | Stillwater Pool | SW3 | 5 | 2 | **7** | 9/5/2012 | 1575 | Coveville | |
| | Stillwater Pool | SW4 | 5 | 2 | **7** | 9/6/2012 | 1128 | Near RM 173 | |
| Downstream | Stillwater Pool** | SW5 | 10 | 2 | **12** | 9/6/2012 | 1891 | Just above Stillwater Dam | |
| **Stillwater Totals** | | | ***30*** | ***10*** | ***40*** | | | | |
| Albany/Troy | | AT1 | 20 | 10 | **30** | 9/6/2012 | 6120 | Between Dunn Memorial Bridge and Route 90 Bridge | 10 PKSD and all forage from east shoreline; 10 PKSD from west shoreline |
| **Albany/Troy Totals** | | | ***20*** | ***10*** | ***30*** | | | | |

Notes:
1. Substitute species for spottail shiner include: fallfish, bluntnose minnow, mimic shiner, or golden shiner.
2. Number of composite samples for forage fish
*Historical New York State Department of Environmental Conservation (NYSDEC) location across from Griffin Island (east channel)
**Historical NYSDEC location near Stillwater Dam
mm = millimeter
PKSD = pumpkinseed, STS = Spottail Shiner
RAMP = Remedial Action Management Program
RM = river mile
TL = Total Length

**Table 3-1**

**Summary of 2012 Modified Green Bay Method Performance Evaluation Homolog and Total Performance Evaluation Results**

| Homolog Group | Performance Evaluation | Performance Evaluation Concentration (ng/L) | Lower Control Limit (70%R) (ng/L) | Upper Control Limit (130%R) (ng/L) | Weight Percent | Concentration (ng/L) | Percent Recovery |
|---|---|---|---|---|---|---|---|
| Monochlorobiphenyl | 8-L | 0.480 | 0.336 | 0.624 | 5.17% | 0.425 | 88.5% |
| Dichlorobiphenyl | 8-L | 1.20 | 0.840 | 1.56 | 17.3% | 1.42 | 119% |
| Trichlorobiphenyl | 8-L | 1.80 | 1.26 | 2.34 | 26.3% | 2.16 | 120% |
| Tetrachlorobiphenyl | 8-L | 2.64 | 1.85 | 3.43 | 26.0% | 2.14 | 80.9% |
| Pentachlorobiphenyl | 8-L | 1.44 | 1.01 | 1.87 | 17.9% | 1.47 | 102% |
| Hexachlorobiphenyl | 8-L | 0.720 | 0.504 | 0.936 | 7.36% | 0.605 | 84.0% |
| Total PCB | 8-L | 8.28 | 5.80 | 10.8 | | 8.10 | 97.8% |
| Monochlorobiphenyl | 1-L | 11.8 | 8.24 | 15.3 | 4.27% | 8.07 | 68.6% |
| Dichlorobiphenyl | 1-L | 29.4 | 20.6 | 38.2 | 17.3% | 32.7 | 111% |
| Trichlorobiphenyl | 1-L | 44.1 | 30.9 | 57.4 | 25.8% | 48.8 | 111% |
| Tetrachlorobiphenyl | 1-L | 64.7 | 45.3 | 84.1 | 26.1% | 49.3 | 76.2% |
| Pentachlorobiphenyl | 1-L | 35.3 | 24.7 | 45.9 | 18.9% | 35.8 | 101% |
| Hexachlorobiphenyl | 1-L | 17.6 | 12.4 | 22.9 | 7.53% | 14.2 | 80.6% |
| Total PCB | 1-L | 203 | 142 | 264 | | 189 | 93.1% |

Notes:

ng/L = nanograms per liter

PCB = polychlorinated biphenyl

R = recovery

**Table 3-2**

**2012 Summary of Modified Green Bay Method Performance Evaluation BZ 4 and BZ 10 Results**

| PCB Congener | Performance Evaluation | Performance Evaluation Concentration (ng/L) | Lower Control Limit (70%R) (ng/L) | Upper Control Limit (130%R) (ng/L) | Concentration (ng/L) | Percent Recovery |
|---|---|---|---|---|---|---|
| BZ 4 | 8-L | 0.240 | 0.168 | 0.312 | 0.254 | 106% |
| BZ 10 | 8-L | 0.240 | 0.168 | 0.312 | 0.250 | 104% |
| BZ 4 | 1-L | 5.88 | 4.12 | 7.65 | 6.19 | 105% |
| BZ 10 | 1-L | 5.88 | 4.12 | 7.65 | 5.87 | 100% |

Notes:

ng/L = nanograms per liter

PCB = polychlorinated biphenyl

R = recovery

**Table 3-3**
**2012 Sediment Performance Evaluation Processing Schedule**

| Week of | Performance Evalulation |
|---|---|
| 6/11/2012 | PE21 |
| 6/18/2012 | PE22 |
| 7/2/2012 | PE21 |
| 10/29/2012 | PE25[1] |
| 11/5/2012 | PE26[1] |

Notes:

1. The field database incorrectly listed the PE blind field identifications as being associated with PE20. The field team did not record the PE numbers for the PEs submitted during the weeks of 10/29/12 and 11/5/12. Based on discussions with the field team, it was assumed that these two PEs were submitted in sequential order.

PE = performance evaluation

**Table 3-4**

**Comparison of Parent and Duplicate Samples Collected Using Manual and Automated Samplers**

| Location | Start Time | Method | Total PCBs (ng/L) | | TSS (mg/L) | |
|---|---|---|---|---|---|---|
| | | | Parent | Duplicate | Parent | Duplicate |
| TI | 11/9/12 2:19 PM | MAN | 143.81 | 145.93 | 8.33 | 9.48 |
| | 11/9/12 2:24 PM | ATM | 124.81 | 127.61 | 5.82 | 7.79 |
| | 5/4/12 10:50 AM | MAN | 30.92 | 34.48 | 1.13 | 1.65 |
| | 5/4/12 10:56 AM | ATM | 32.85 | 30.16 | 2.15 | 3.72 |
| L5 | 6/26/12 3:15 PM | MAN | 488.88 | 540.23 | 5.27 | 5.74 |
| | 6/26/12 3:30 PM | ATM | 399.63 | 415.98 | 4.71 | 4.55 |
| | 7/25/12 2:00 PM | MAN | 296.01 | 290.18 | 1.00 | 1.20 |
| | 7/25/12 2:05 PM | ATM | 253.33 | 246.12 | 3.41 | 2.67 |
| | 8/24/12 9:50 AM | MAN | 350.25 | 357.57 | ND | 1.79 |
| | 8/24/12 9:55 AM | ATM | 269.04 | 251.60 | 3.74 | 6.47 |
| | 9/21/12 9:37 AM | MAN | 486.99 | 519.94 | 6.90 | ND |
| | 9/21/12 9:42 AM | ATM | 261.02 | 278.61 | ND | ND |
| | 11/9/12 1:30 PM | MAN | 102.66 | 104.07 | 4.51 | 3.35 |
| | 11/9/12 1:35 PM | ATM | 84.90 | 87.99 | 5.60 | 4.85 |
| | 5/4/12 11:59 AM | MAN | 22.13 | 23.28 | 4.49 | 4.51 |
| | 5/4/12 12:05 PM | ATM | 20.89 | 20.64 | 4.32 | 5.26 |
| | 6/26/12 12:35 PM | MAN | 155.90 | 167.76 | 4.80 | 5.13 |
| | 6/26/12 12:55 PM | ATM | 146.69 | 159.01 | 4.52 | 3.91 |
| WF | 7/25/12 11:40 AM | MAN | 176.36 | 174.62 | 4.29 | 4.21 |
| | 7/25/12 11:50 AM | ATM | 166.08 | 161.63 | 3.94 | 4.17 |
| | 8/24/12 12:00 PM | MAN | 105.24 | 103.06 | 2.34 | 2.38 |
| | 8/24/12 12:05 PM | ATM | 86.99 | 86.85 | 3.17 | 3.21 |
| | 9/21/12 10:51 AM | MAN | 247.70 | 251.05 | 10.00 | 8.97 |
| | 9/21/12 10:55 AM | ATM | 194.32 | 210.88 | 10.40 | 8.18 |
| | 11/12/12 2:02 PM | MAN | 92.77 | 89.18 | 4.86 | 6.53 |
| | 11/12/12 2:05 PM | ATM | 92.24 | 85.67 | 4.42 | 6.29 |

Notes:

MAN indicates a manual sample was collected using the MADIS.

ATM indicates samples were collected from the ISCO sampler inside the station.

L5 = Lock 5

mg/L = milligrams per liter

ND = non-detect

ng/L = nanograms per liter

PCB = polychlorinated biphenyl

TI = Thompson Island

TSS = total suspended solids

WF = Waterford

**Table 3-5**
**Summary of Percentage of Validated 2012 RAMP Data**

| Analysis Fraction | Total ENV Samples | | |
|---|---|---|---|
| | Number of ENV Samples | Number of ENV Samples Validated | Percent ENV Samples Validated |
| PCB mGBM in water (NE294_00/NE294_00A and NE293_00) | 177 | 10 | 5.6% |
| Aroclor PCBs in water (NE273_02) | 888 | 45 | 5.1% |
| Total metals in water (200.8 SLCH) | 4 | 1 | 25.0% |
| Dissolved metals in water (200.8 SL) | 4 | 1 | 25.0% |
| Hardness in water (SM 2340B) | 4 | 1 | 25.0% |
| Total suspended solids in water (SM 2540D) | 995 | 51 | 5.1% |
| Total organic carbon in water (SM 5310B) | 55 | 3 | 5.5% |
| Aroclor PCBs in sediment (GEHR8082) | 96 | 0[1] | 0.0% |
| Total organic carbon in sediment (Lloyd Kahn) | 96 | 18 | 18.8% |
| Aroclor PCBs in fish tissue (SW-846 8082, NE148_08) | 642 | 34 | 5.3% |

Notes:

1. Aroclor PCB analysis by Standard Operating Procedure (SOP) GEHR8082 was also performed as part of the residual sediments and Supplemental Engineering Design Collection programs. The overall validation percentage of 5% was met for all the programs combined.

ENV = environmental

mGBM = Modified Green Bay Method

PCB = polychlorinated biphenyl

RAMP = Remedial Action Monitoring Program

## Table 4-1
## Near-field Program PCB and TSS Summary Statistics

| Location | Sample Counts | | Detect | Non-detect | Minimum | Average | Maximum |
|---|---|---|---|---|---|---|---|
| | ENV | DUP | | | | | |
| **Aroclor PCBs (ng/L) Near-field** | | | | | | | |
| MONITORING-TRAN-RM189.10 | 32 | 3 | 35 | 0 | 50.1 | 306.5 | 783.9 |
| MONITORING-TRAN-RM190.20 | 13 | 1 | 14 | 0 | 83.1 | 379.2 | 601.6 |
| MONITORING-TRAN-RM190.70 | 37 | 5 | 42 | 0 | 37 | 380.7 | 906 |
| MONITORING-TRAN-RM191.10 | 57 | 3 | 60 | 0 | 72.7 | 447.7 | 2841 |
| MONITORING-TRAN-RM191.20 | 7 | 1 | 8 | 0 | 162.5 | 527.5 | 888.3 |
| MONITORING-TRAN-RM191.30 | 11 | 1 | 12 | 0 | 82 | 690.0 | 4214 |
| MONITORING-TRAN-RM191.50 | 10 | 0 | 10 | 0 | 20.9 | 291.1 | 647 |
| MONITORING-TRAN-RM191.80 | 4 | 0 | 4 | 0 | 32.4 | 52.8 | 85.4 |
| MONITORING-TRAN-RM192.10 | 30 | 3 | 25 | 8 | 17.8 | 141.9 | 690.1 |
| NFS-BCKGRD-RM191.50 | 19 | 0 | 1 | 18 | 18.5 | 18.5 | 18.5 |
| NFS-BCKGRD-RM192.00 | 44 | 1 | 8 | 37 | 16.4 | 18.8 | 23 |
| NFS-BCKGRD-RM192.30 | 40 | 1 | 5 | 36 | 16.3 | 23.9 | 44.5 |
| NFS-BCKGRD-RM192.60 | 83 | 1 | 2 | 82 | 18 | 18.5 | 19 |
| Thompson Island Automated | 22 | 2 | 24 | 0 | 54 | 93.5 | 133 |
| **Total mGBM PCBs (ng/L) Background** | | | | | | | |
| NFS-BCKGRD-RM192.00 | 1 | 0 | 1 | 0 | 7.8 | 7.8 | 7.8 |
| NFS-BCKGRD-RM192.30 | 2 | 0 | 2 | 0 | 6.4 | 9.8 | 13.1 |
| NFS-BCKGRD-RM192.60 | 3 | 0 | 3 | 0 | 3.4 | 6.9 | 10.3 |
| **TSS (mg/L) Near-field** | | | | | | | |
| MONITORING-TRAN-RM189.10 | 32 | 3 | 32 | 3 | 1.30 | 6.27 | 15.8 |
| MONITORING-TRAN-RM190.20 | 13 | 1 | 11 | 3 | 1.23 | 4.46 | 8.75 |
| MONITORING-TRAN-RM190.70 | 37 | 5 | 38 | 4 | 1.10 | 3.82 | 6.06 |
| MONITORING-TRAN-RM191.10 | 57 | 3 | 54 | 6 | 1.21 | 5.00 | 47.3 |
| MONITORING-TRAN-RM191.20 | 7 | 1 | 8 | 0 | 1.79 | 4.15 | 5.38 |
| MONITORING-TRAN-RM191.30 | 11 | 1 | 12 | 0 | 1.35 | 3.92 | 8.95 |
| MONITORING-TRAN-RM191.50 | 10 | 0 | 7 | 3 | 2.1 | 7.8 | 29.4 |
| MONITORING-TRAN-RM191.80 | 4 | 0 | 4 | 0 | 1.9 | 3.1 | 3.9 |
| MONITORING-TRAN-RM192.10 | 30 | 3 | 26 | 7 | 1.1 | 2.7 | 6.8 |
| NFS-BCKGRD-RM191.50 | 19 | 0 | 13 | 6 | 1.1 | 2.6 | 5.6 |
| NFS-BCKGRD-RM192.00 | 45 | 1 | 32 | 14 | 1.1 | 4.9 | 20.2 |
| NFS-BCKGRD-RM192.30 | 42 | 1 | 35 | 8 | 1.0 | 2.7 | 6.5 |
| NFS-BCKGRD-RM192.60 | 86 | 1 | 68 | 19 | 1.2 | 3.0 | 14.8 |
| Thompson Island Automated | 22 | 2 | 21 | 3 | 1.4 | 5.2 | 20.3 |

Notes:

Duplicate samples are averaged with parent samples.

Statistics are based on detected results only.

DUP = duplicate

ENV = environmental

mg/L = milligrams per liter

mGBM = Modified Green Bay Method

ng/L = nanograms per liter

PCB = polychlorinated biphenyl

TSS = total suspended solids

## Table 4-2
## Near-field Program Metals Summary Statistics

| Location | Sample Counts | | Detect | Non-detect | Minimum | Average | Maximum |
|---|---|---|---|---|---|---|---|
| | ENV | DUP | | | | | |
| **Dissolved TAL – Cadmium (µg/L)** | | | | | | | |
| MONITORING-TRAN-RM192.10 | 5 | 0 | 0 | 5 | ND | ND | ND |
| **Dissolved TAL – Lead (µg/L)** | | | | | | | |
| MONITORING-TRAN-RM192.10 | 5 | 0 | 2 | 3 | 0.16 | 0.29 | 0.43 |
| **TAL – Cadmium (µg/L)** | | | | | | | |
| MONITORING-TRAN-RM192.10 | 5 | 0 | 0 | 5 | ND | ND | ND |
| **TAL – Calcium (µg/L)** | | | | | | | |
| MONITORING-TRAN-RM192.10 | 5 | 0 | 4 | 1 | 6690 | 7900 | 9680 |
| **TAL – Lead (µg/L)** | | | | | | | |
| MONITORING-TRAN-RM192.10 | 5 | 0 | 2 | 3 | 0.46 | 0.57 | 0.69 |
| **TAL – Magnesium (µg/L)** | | | | | | | |
| MONITORING-TRAN-RM192.10 | 5 | 0 | 4 | 1 | 1090 | 1270 | 1420 |

Notes:

Duplicate samples are averaged with parent samples.

Statistics are based on detected results only.

µg/L = micrograms per liter

DUP = duplicate

ENV = environmental

TAL = target analyte list

## Table 4-3
## Near-field Program Water Quality Parameter Summary Statistics

| Operation | Monitoring Role | Parameter | Average | Minimum | Maximum | Standard Deviation | Units |
|---|---|---|---|---|---|---|---|
| CU26-29: 1 | Background Station Location | Dissolved Oxygen | 8.64 | 6.55 | 10.8 | 0.939 | mg/L |
| CU26-29: 1 | Background Station Location | pH | 7.49 | 7.04 | 8.48 | 0.257 | pH |
| CU26-29: 1 | Background Station Location | Turbidity | 4.68 | 0.0 | 162 | 12.1 | NTU |
| CU26-29: 1 | Near-Field Monitoring Transect | Dissolved Oxygen | 8.45 | 6.01 | 10.9 | 0.844 | mg/L |
| CU26-29: 1 | Near-Field Monitoring Transect | pH | 7.52 | 6.71 | 8.86 | 0.286 | pH |
| CU26-29: 1 | Near-Field Monitoring Transect | Turbidity | 9.74 | 0.0 | 167 | 16.6 | NTU |
| CU30-36: 1 | Background Station Location | Dissolved Oxygen | 8.64 | 6.55 | 10.8 | 0.939 | mg/L |
| CU30-36: 1 | Background Station Location | pH | 7.49 | 7.04 | 8.48 | 0.257 | pH |
| CU30-36: 1 | Background Station Location | Turbidity | 4.68 | 0.0 | 162 | 12.1 | NTU |
| CU30-36: 1 | Near-Field Monitoring Transect | Dissolved Oxygen | 8.32 | 6.01 | 10.5 | 0.734 | mg/L |
| CU30-36: 1 | Near-Field Monitoring Transect | pH | 7.53 | 6.80 | 8.86 | 0.285 | pH |
| CU30-36: 1 | Near-Field Monitoring Transect | Turbidity | 11.3 | 0.0 | 167 | 18.4 | NTU |
| CU37-40: 1 | Background Station Location | Dissolved Oxygen | 8.64 | 6.55 | 10.8 | 0.939 | mg/L |
| CU37-40: 1 | Background Station Location | pH | 7.49 | 7.04 | 8.48 | 0.257 | pH |
| CU37-40: 1 | Background Station Location | Turbidity | 4.68 | 0.0 | 162 | 12.1 | NTU |
| CU37-40: 1 | Near-Field Monitoring Transect | Dissolved Oxygen | 8.15 | 6.01 | 10.2 | 0.662 | mg/L |
| CU37-40: 1 | Near-Field Monitoring Transect | pH | 7.49 | 6.80 | 8.86 | 0.291 | pH |
| CU37-40: 1 | Near-Field Monitoring Transect | Turbidity | 11.2 | 0.0 | 167 | 18.3 | NTU |
| CU41-45: 1 | Background Station Location | Dissolved Oxygen | 10.7 | 8.82 | 12.9 | 0.975 | mg/L |
| CU41-45: 1 | Background Station Location | pH | 7.35 | 7.03 | 7.82 | 0.147 | pH |
| CU41-45: 1 | Background Station Location | Turbidity | 9.41 | 2.20 | 154 | 13.5 | NTU |
| CU41-45: 1 | Near-Field Monitoring Transect | Dissolved Oxygen | 10.5 | 8.57 | 12.8 | 0.949 | mg/L |
| CU41-45: 1 | Near-Field Monitoring Transect | pH | 7.36 | 6.66 | 8.10 | 0.167 | pH |
| CU41-45: 1 | Near-Field Monitoring Transect | Turbidity | 8.97 | 0.0 | 152 | 9.10 | NTU |
| CU46-48: 1 | Background Station Location | Dissolved Oxygen | 10.7 | 8.82 | 12.9 | 0.975 | mg/L |
| CU46-48: 1 | Background Station Location | pH | 7.35 | 7.03 | 7.82 | 0.147 | pH |
| CU46-48: 1 | Background Station Location | Turbidity | 9.41 | 2.20 | 154 | 13.5 | NTU |
| CU46-48: 1 | Near-Field Monitoring Transect | Dissolved Oxygen | 10.5 | 8.57 | 12.8 | 0.949 | mg/L |
| CU46-48: 1 | Near-Field Monitoring Transect | pH | 7.36 | 6.66 | 8.10 | 0.167 | pH |
| CU46-48: 1 | Near-Field Monitoring Transect | Turbidity | 8.97 | 0.0 | 152 | 9.10 | NTU |

**Table 4-3**

**Near-field Program Water Quality Parameter Summary Statistics**

| Operation | Monitoring Role | Parameter | Average | Minimum | Maximum | Standard Deviation | Units |
|---|---|---|---|---|---|---|---|
| CU50-54: 1 | Background Station Location | Dissolved Oxygen | 11.4 | 8.82 | 14.8 | 1.44 | mg/L |
| CU50-54: 1 | Background Station Location | pH | 7.46 | 7.03 | 7.92 | 0.223 | SU |
| CU50-54: 1 | Background Station Location | Turbidity | 7.53 | 1.10 | 154 | 12.0 | NTU |
| CU50-54: 1 | Near-Field Monitoring Transect | Dissolved Oxygen | 10.9 | 9.56 | 12.8 | 0.848 | mg/L |
| CU50-54: 1 | Near-Field Monitoring Transect | pH | 7.30 | 6.66 | 7.85 | 0.133 | SU |
| CU50-54: 1 | Near-Field Monitoring Transect | Turbidity | 8.61 | 0.0 | 152 | 9.88 | NTU |
| TID Automated | Near-Field Monitoring Transect | Dissolved Oxygen | 9.7 | 8.3 | 12.9 | 0.670 | mg/L |
| TID Automated | Near-Field Monitoring Transect | pH | 7.7 | 6.4 | 8.0 | 0.150 | SU |
| TID Automated | Near-Field Monitoring Transect | Turbidity | 1.7 | 0.1 | 21.0 | 1.40 | NTU |

Notes:

mg/L = miligrams per liter

NTU = nephelometric turbidity units

SU = standard units

TID = Thompson Island Dam

## Table 4-4
## Far-field and Off-season Program PCB and TSS Summary Statistics

| Location | Sample Counts | | Detect | Non-Detect | Minimum | Average | Maximum |
|---|---|---|---|---|---|---|---|
| | ENV | DUP | | | | | |
| **PCBs (ng/L) Far-field** | | | | | | | |
| Bakers Falls | 7 | 1 | 5 | 3 | 1.0 | 1.7 | 2.5 |
| Rogers Island | 6 | 1 | 7 | 0 | 1.5 | 3.0 | 9.6 |
| Thompson Island Automated | 2 | 0 | 0 | 2 | ND | ND | ND |
| Lock 5 | 205 | 18 | 223 | 0 | 19.0 | 211.9 | 780.1 |
| Stillwater | 28 | 3 | 31 | 0 | 28.1 | 219.5 | 432.1 |
| Waterford | 205 | 12 | 211 | 6 | 16.3 | 103.1 | 292.2 |
| Albany | 7 | 1 | 7 | 1 | 41.1 | 98.5 | 148.2 |
| Poughkeepsie | 7 | 1 | 2 | 6 | 23.3 | 23.8 | 24.2 |
| **TSS (mg/L) Far-field** | | | | | | | |
| Bakers Falls | 7 | 1 | 6 | 2 | 1.3 | 2.0 | 2.6 |
| Rogers Island | 6 | 1 | 6 | 1 | 1.1 | 1.8 | 2.3 |
| Thompson Island Automated | 2 | 0 | 2 | 0 | 2.0 | 2.5 | 3.0 |
| Lock 5 | 205 | 18 | 204 | 19 | 1.0 | 5.5 | 57.9 |
| Stillwater | 28 | 3 | 29 | 2 | 1.4 | 7.5 | 72.4 |
| Waterford | 205 | 12 | 203 | 14 | 1.1 | 9.6 | 205.0 |
| Albany | 7 | 1 | 8 | 0 | 3.1 | 5.8 | 9.4 |
| Poughkeepsie | 7 | 1 | 8 | 0 | 9.1 | 13.8 | 24.8 |
| **PCBs (ng/L) Off-season** | | | | | | | |
| Bakers Falls | 5 | 0 | 1 | 4 | 1.6 | 1.6 | 1.6 |
| Rogers Island | 1 | 0 | 1 | 0 | 2.6 | 2.6 | 2.6 |
| Thompson Island Automated | 22 | 0 | 9 | 13 | 8.4 | 14.5 | 32.0 |
| Lock 5 | 22 | 0 | 16 | 6 | 10.4 | 23.3 | 58.6 |
| Waterford | 22 | 4 | 17 | 9 | 7.7 | 13.7 | 26.5 |
| Albany | 1 | 0 | 1 | 0 | 22.6 | 22.6 | 22.6 |
| Poughkeepsie | 1 | 0 | 1 | 0 | 17.2 | 17.2 | 17.2 |
| **TSS (mg/L) Off-season** | | | | | | | |
| Bakers Falls | 5 | 0 | 3 | 2 | 1.1 | 1.4 | 1.5 |
| Rogers Island | 1 | 0 | 0 | 1 | ND | ND | ND |
| Thompson Island Automated | 22 | 0 | 15 | 7 | 1.0 | 3.8 | 11.4 |
| Lock 5 | 22 | 0 | 21 | 1 | 1.5 | 5.8 | 17.6 |
| Waterford | 22 | 4 | 20 | 6 | 1.3 | 5.3 | 15.2 |
| Albany | 1 | 0 | 1 | 0 | 3.6 | 3.6 | 3.6 |
| Poughkeepsie | 1 | 0 | 1 | 0 | 12.2 | 12.2 | 12.2 |
| **TOC (mg/L) Off-season** | | | | | | | |
| Bakers Falls | 4 | 0 | 4 | 0 | 3.66 | 4.08 | 4.85 |
| Lock 5 | 17 | 0 | 17 | 0 | 3.78 | 4.33 | 6.62 |
| Thompson Island Automated | 17 | 0 | 17 | 0 | 3.68 | 4.15 | 5.50 |
| Waterford | 17 | 3 | 20 | 0 | 3.30 | 3.65 | 4.47 |

Notes:

1. Duplicate samples are averaged with parent samples.
2. Statistics are based on detected results only.
3. Bakers Falls and Rogers Island were analyzed for PCBs by the Modified Green Bay Method (mGBM).
4. Total organic carbon (TOC) was collected and analyzed in accordance with the 2011 Remedial Action Monitoring Program Quality Assurance Project Plan (RAMP QAPP) until May 1, 2012; after this date, data were obtained in accordance with the Phase 2 RAMP QAPP.

DUP = duplicate
ENV = environmental
mg/L = milligrams per liter
ND = not detected
ng/L = nanograms per liter
PCB = polychlorinated biphenyl
TOC = total organic carbon
TSS = total suspended solids

**Table 4-5**
**Far-field Program Water Quality Parameter Summary Statistics**

| Location | Parameter | Minimum | Average | Maximum | Units |
|---|---|---|---|---|---|
| WFF-LOC5 | Dissolved oxygen | 6.00 | 8.29 | 14.8 | mg/L |
| WFF-LOC5 | pH | 7.01 | 7.37 | 7.87 | pH |
| WFF-LOC5 | Specific conductance | 0.066 | 0.108 | 0.226 | µs/cm |
| WFF-LOC5 | Turbidity | 2.50 | 8.23 | 166 | NTU |
| WFF-LOC5 | Water temperature | 7.64 | 20.7 | 28.5 | °C |
| WFF-WAFA | Dissolved oxygen | 6.00 | 7.07 | 12.6 | mg/L |
| WFF-WAFA | pH | 6.69 | 7.50 | 8.13 | pH |
| WFF-WAFA | Specific conductance | 0.040 | 0.182 | 0.336 | µs/cm |
| WFF-WAFA | Turbidity | 0.000 | 21.4 | 167 | NTU |
| WFF-WAFA | Water temperature | 7.33 | 21.2 | 29.0 | °C |
| WFF-TIDA | Dissolved oxygen | 6.89 | 11.0 | 14.3 | mg/L |
| WFF-TIDA | pH | 6.37 | 7.74 | 8.37 | pH |
| WFF-TIDA | Turbidity | 0.100 | 8.83 | 164 | NTU |

Notes:

WFF-TIDA water quality parameters were only collected during the off-season monitoring program.

°C = degrees Celsius

µs/cm = microsiemens per centimeter

mg/L = milligrams per liter

NTU = nephelometric turbidity units

**Table 4-6**
**Results of Grain Size Analysis, Total Organic Carbon, Total PCBs, and Tri+ PCBs for Spring Surface Sediment Samples**

| Sample Name | Clay (%) | Silt (%) | Fine Sand (%) | Medium Sand (%) | Coarse Sand (%) | Gravel (%) | Total Organic Carbon (mg/kg) | Total PCBs (mg/kg) | Tri+ PCBs (mg/kg) |
|---|---|---|---|---|---|---|---|---|---|
| SSC-RS2-8786-C146-000000 | 0.9 | 2.7 | 40.3 | 48.2 | 5.7 | 2.2 | 9300 | 11.60 | 6.24 |
| SSC-RS2-8483-C220-000000 | 9.5 | 43.2 | 44.8 | 2.2 | 0.3 | 0 | 28000 | 11.00 | 4.93 |
| SSC-RS2-8483-C215-000000 | 11 | 49.2 | 20 | 11.7 | 1.8 | 6.3 | 24000 | 13.80 | 6.17 |
| SSC-RS2-8584-209-000000 | 1.85 | 4.7 | 47.9 | 42.3 | 2.95 | 0.3 | 2550 | 4.70 | 2.39 |
| SSC-RS2-8483-C214-000000 | 6.4 | 22.5 | 41.1 | 20 | 4.2 | 5.8 | 14000 | 4.90 | 2.15 |
| SSC-RS2-8483-213-000000 | 1.55 | 4.2 | 77.55 | 15.6 | 1 | 0.1 | 4200 | 4.10 | 2.00 |
| SSC-RS2-8483-C222-000000 | 0.6 | 2.5 | 34.9 | 54 | 7.9 | 0.1 | 7400 | 4.90 | 2.53 |
| SSC-RS2-8988-C115-000000 | 2.2 | 28.9 | 60.9 | 6.1 | 1.3 | 0.6 | 16000 | 3.70 | 1.75 |
| SSC-RS2-8988-114-000000 | 5.4 | 24.2 | 65.5 | 4.3 | 0.4 | 0.2 | 48000 | 9.90 | 4.70 |
| SSC-RS2-8887-122-000000 | 8.5 | 64.8 | 17.4 | 1.5 | 2.6 | 5.2 | 49000 | 11.20 | 5.80 |
| SSC-RS2-8584-C192-000000 | 7.6 | 91.8 | 0 | 0 | 0.5 | 0.1 | 14000 | 7.80 | 3.40 |
| SSC-RS2-8887-C139-000000 | 6.9 | 30.6 | 34.4 | 23.4 | 3.2 | 1.5 | 45000 | 29.00 | 12.53 |
| SSC-RS2-8584-C189-000000 | 0.8 | 0.8 | 12.7 | 74.3 | 10.8 | 0.6 | 8700 | 2.40 | 1.34 |
| SSC-RS2-8786-C147-000000 | 0.7 | 2.4 | 35.7 | 53.4 | 5.7 | 2.1 | 15000 | 11.40 | 6.68 |
| SSC-RS2-8786-153-000000 | 0.3 | 1.25 | 61.4 | 36.25 | 0.8 | 0.05 | 1630 | 2.08 | 1.27 |
| SSC-RS2-8685-C154-000000 | 6.7 | 25.6 | 59.1 | 6.8 | 1 | 0.8 | 30000 | 7.70 | 3.16 |
| SSC-RS2-8685-C162-000000 | 4.2 | 31.2 | 58.1 | 4.4 | 1.7 | 0.4 | 47000 | 12.30 | 5.11 |
| SSC-RS2-8685-C182-000000 | 22.7 | 44.9 | 29.5 | 2.9 | 0 | 0 | 65000 | 672.00 | 134.12 |
| SSC-RS2-8584-C190-000000 | 22.4 | 51.8 | 21.6 | 1.2 | 0.9 | 2.1 | 43000 | 122.00 | 34.02 |
| SSC-RS2-8584-C194-000000 | 3.7 | 7 | 51.25 | 32.1 | 3.55 | 2.4 | 8050 | 1.27 | 0.57 |
| SSC-RS2-8584-204-000000 | 1.4 | 8.1 | 32 | 50.6 | 7.4 | 0.4 | 4100 | 1.36 | 0.72 |
| SSC-RS2-8584-C206-000000 | 9 | 19.6 | 58.6 | 8.3 | 3.5 | 1 | 11000 | 8.10 | 3.37 |
| SSC-RS2-8988-120-000000 | 7.7 | 32.7 | 26.7 | 5.4 | 3.1 | 24.4 | 66000 | 59.20 | 24.61 |
| SSC-RS2-8887-C129-000000 | 1.3 | 6.2 | 51.8 | 10.5 | 13.4 | 16.9 | 10000 | 5.30 | 2.44 |
| SSC-RS2-8685-C168-000000 | 2.6 | 8.4 | 16.9 | 21.3 | 11.8 | 39 | 15000 | 5.00 | 2.47 |
| SSC-RS2-8887-C121-000000 | 4.2 | 10.4 | 24.8 | 44 | 11.9 | 4.7 | 7700 | 4.30 | 1.76 |
| SSC-RS2-8988-119-000000 | 1.9 | 4.4 | 69.6 | 21.4 | 2.5 | 0.1 | 7200 | 4.00 | 2.02 |
| SSC-RS2-8988-118-000000 | 5.5 | 34.5 | 49.5 | 8.5 | 1.3 | 0.8 | 17000 | 70.00 | 25.20 |
| SSC-RS2-8887-C127-000000 | 1.9 | 10.6 | 26.7 | 30.5 | 16.6 | 13.7 | 19000 | 9.40 | 5.40 |

**Table 4-6**
**Results of Grain Size Analysis, Total Organic Carbon, Total PCBs, and Tri+ PCBs for Spring Surface Sediment Samples**

| Sample Name | Clay (%) | Silt (%) | Fine Sand (%) | Medium Sand (%) | Coarse Sand (%) | Gravel (%) | Total Organic Carbon (mg/kg) | Total PCBs (mg/kg) | Tri+ PCBs (mg/kg) |
|---|---|---|---|---|---|---|---|---|---|
| SSC-RS2-8887-C130-000000 | 0.6 | 0.5 | 37.4 | 50.6 | 8.7 | 2.2 | 1500 | 3.90 | 2.32 |
| SSC-RS2-8887-138-000000 | 0.4 | 2.5 | 20.8 | 26.7 | 24.7 | 24.9 | 5100 | 8.90 | 5.02 |
| SSC-RS2-8887-137-000000 | 0.6 | 3.2 | 49.9 | 32.9 | 9.9 | 3.5 | 27000 | 3.80 | 2.00 |
| SSC-RS2-8887-C136-000000 | 2.3 | 6.5 | 40.6 | 40.2 | 8.6 | 1.8 | 31000 | 20.10 | 9.82 |
| SSC-RS2-8786-C148-000000 | 3.2 | 21 | 10.3 | 50.1 | 11 | 4.4 | 26000 | 4.20 | 2.44 |
| SSC-RS2-8584-C203-000000 | 1.8 | 6.1 | 39.1 | 45.7 | 2.6 | 4.7 | 10000 | 6.50 | 2.99 |
| SSC-RS2-8685-161-000000 | 0.5 | 11.6 | 57.9 | 21.2 | 3 | 5.8 | 240000 | 59.00 | 28.28 |
| SSC-RS2-8483-C224-000000 | 2.6 | 37.4 | 15.9 | 20 | 21.5 | 2.7 | 22000 | 6.40 | 3.13 |
| SSC-RS2-8685-167-000000 | 4.8 | 18.15 | 62.1 | 11.7 | 1.6 | 1.65 | 34000 | 9.45 | 4.48 |
| SSC-RS2-8685-165-000000 | 3.3 | 42.1 | 47.5 | 3 | 1.2 | 2.9 | 47000 | 9.90 | 5.62 |
| SSC-RS2-8685-C170-000000 | 0.2 | 1.8 | 23.1 | 47.1 | 14.8 | 13 | 4100 | 5.10 | 2.87 |
| SSC-RS2-8685-172-000000 | 1.6 | 7.7 | 14.1 | 62.8 | 11.1 | 2.6 | 12000 | 4.80 | 2.29 |
| SSC-RS2-8685-C173-000000 | 4.9 | 27.7 | 48.8 | 12.8 | 3.8 | 2 | 52000 | 5.30 | 2.28 |
| SSC-RS2-8685-C176-000000 | 1.2 | 2.4 | 38.6 | 53.9 | 2.2 | 1.7 | 4500 | 1.77 | 1.02 |
| SSC-RS2-8685-C175-000000 | 9.7 | 40.3 | 23.2 | 21 | 1.7 | 4.1 | 19000 | 5.90 | 2.67 |
| SSC-RS2-8685-187-000000 | 0.9 | 1.4 | 8.4 | 53.2 | 20.6 | 15.5 | 29000 | 3.60 | 2.04 |
| SSC-RS2-8685-185-000000 | 0.9 | 1.5 | 71.3 | 26.1 | 0.2 | 0 | 2000 | 1.94 | 0.92 |
| SSC-RS2-8584-C188-000000 | 3.5 | 14.7 | 22.7 | 19.5 | 2.4 | 37.2 | 11000 | 2.90 | 1.25 |
| SSC-RS2-8685-C156-000000 | 6.1 | 40.5 | 44.9 | 5.2 | 1.9 | 1.4 | 61000 | 12.30 | 5.73 |
| SSC-RS2-8483-C216-000000 | 4.2 | 23.3 | 68.2 | 3.6 | 0.6 | 0.1 | 22000 | 7.40 | 3.27 |
| **Minimum** | 0.20 | 0.50 | 0.00 | 0.00 | 0.00 | 0.00 | 1500 | 1.27 | 0.57 |
| **Maximum** | 22.70 | 91.80 | 77.55 | 74.30 | 24.70 | 39.00 | 240000 | 672.00 | 134.12 |
| **Average** | 4.34 | 19.99 | 39.09 | 25.48 | 5.71 | 5.39 | 26470 | 26.48 | 8.15 |

Notes:

1. Duplicate samples are averaged with parent samples.
2. Non-detects were set to zero for Aroclor PCBs and PCBs by Modified Green Bay Method (mGBM) used in Tri+ PCBs calculation. All other analytical results are above the laboratory detection limit.

mg/kg = milligrams per kilogram PCB = polychlorinated biphenyl

**Table 4-7**
**Results of Grain Size Analysis, Total Organic Carbon, Total PCBs, and Tri+ PCBs for Fall Surface Sediment Samples**

| Sample Name | Clay (%) | Silt (%) | Fine Sand (%) | Medium Sand (%) | Coarse Sand (%) | Gravel (%) | Organic Carbon (mg/kg) | Total PCBs (mg/kg) | Tri+ PCBs (mg/kg) |
|---|---|---|---|---|---|---|---|---|---|
| SSC-RS2-8786-C147F-000000 | 2.3 | 14.3 | 25.6 | 41.7 | 11.2 | 4.9 | 12000 | 15.50 | 7.95 |
| SSC-RS2-8584-C203F-000000 | 2 | 3.5 | 40.1 | 52.9 | 1.2 | 0.4 | 6100 | 2.04 | 1.13 |
| SSC-RS2-8483-C215F-000000 | 10.8 | 42.9 | 29.6 | 14.8 | 0.6 | 1.3 | 16000 | 4.50 | 1.71 |
| SSC-RS2-8584-209F-000000 | 2.8 | 10.4 | 45.2 | 39.7 | 0.8 | 1.1 | 6300 | 2.80 | 1.47 |
| SSC-RS2-8483-C214F-000000 | 6.1 | 26.9 | 39.2 | 20.6 | 5.3 | 1.9 | 17000 | 3.80 | 1.69 |
| SSC-RS2-8988-C115F-000000 | 2.5 | 19.5 | 49.1 | 9.4 | 4.8 | 14.7 | 7600 | 3.80 | 1.69 |
| SSC-RS2-8988-114F-000000 | 6.5 | 33.8 | 51.5 | 4.4 | 0.2 | 3.6 | 33000 | 8.90 | 4.17 |
| SSC-RS2-8887-122F-000000 | 7.5 | 40 | 51.5 | 0.8 | 0.2 | 0 | 26000 | 8.40 | 3.87 |
| SSC-RS2-8887-C129F-000000 | 6.4 | 31.4 | 46.1 | 5.7 | 5 | 5.4 | 28000 | 8.40 | 3.41 |
| SSC-RS2-8584-C189F-000000 | 1.6 | 3.7 | 11.3 | 64.6 | 11 | 7.8 | 41000 | 6.40 | 3.59 |
| SSC-RS2-8786-C146F-000000 | 1.3 | 1.6 | 50.7 | 38 | 7 | 1.4 | 34000 | 11.90 | 6.67 |
| SSC-RS2-8584-C188F-000000 | 7 | 22.8 | 21 | 25.7 | 1.6 | 21.9 | 15000 | 3.70 | 1.75 |
| SSC-RS2-8786-153F-000000 | 0.75 | 2.2 | 49.4 | 45.6 | 2.05 | 0.05 | 74550 | 2.53 | 1.51 |
| SSC-RS2-8685-C154F-000000 | 6.2 | 28.1 | 60.6 | 3.7 | 0.3 | 1.1 | 22000 | 16.80 | 6.05 |
| SSC-RS2-8685-C162F-000000 | 7.9 | 27.1 | 55.7 | 5.6 | 1 | 2.7 | 27000 | 15.50 | 6.56 |
| SSC-RS2-8685-C182F-000000 | 16.35 | 32.65 | 47.3 | 3.3 | 0.05 | 0.35 | 25500 | 42.70 | 13.45 |
| SSC-RS2-8584-C190F-000000 | 4 | 14 | 72.3 | 9.2 | 0.5 | 0 | 17000 | 1.07 | 0.43 |
| SSC-RS2-8584-C194F-000000 | 6.7 | 23.7 | 38.7 | 29.9 | 0.6 | 0.4 | 10000 | 1.39 | 0.63 |
| SSC-RS2-8584-204F-000000 | 6.5 | 15.8 | 37.6 | 36.6 | 1.4 | 2.1 | 11000 | 3.20 | 1.53 |
| SSC-RS2-8584-C206F-000000 | 6.8 | 10.2 | 56.2 | 26.1 | 0.8 | 0 | 20000 | 2.80 | 1.47 |
| SSC-RS2-8483-C216F-000000 | 9.3 | 32.5 | 51.3 | 4.3 | 2.2 | 0.5 | 26000 | 19.70 | 6.38 |
| SSC-RS2-8483-C220F-000000 | 10.1 | 35.6 | 47 | 5.9 | 1.1 | 0.3 | 30000 | 36.00 | 12.74 |
| SSC-RS2-8887-C139F-000000 | 7.7 | 39.4 | 27.6 | 20.2 | 1.4 | 3.7 | 43000 | 22.10 | 7.79 |
| SSC-RS2-8685-161F-000000 | 2.1 | 3.9 | 65.6 | 20.4 | 2.2 | 5.9 | 220000 | 48.90 | 25.25 |
| SSC-RS2-8988-120F-000000 | 12.7 | 59.5 | 16.8 | 2.5 | 2.8 | 5.7 | 33000 | 8.50 | 3.42 |
| SSC-RS2-8887-C121F-000000 | 4.1 | 13.8 | 29 | 36.5 | 10 | 6.6 | 12000 | 4.00 | 1.72 |
| SSC-RS2-8988-119F-000000 | 0.8 | 2.9 | 50 | 30.6 | 7.7 | 8.1 | 2300 | 6.50 | 3.14 |
| SSC-RS2-8988-118F-000000 | 4.5 | 24.3 | 65 | 1.9 | 0.9 | 3.4 | 17000 | 4.60 | 1.95 |

**Table 4-7**
**Results of Grain Size Analysis, Total Organic Carbon, Total PCBs, and Tri+ PCBs for Fall Surface Sediment Samples**

| Sample Name | Clay (%) | Silt (%) | Fine Sand (%) | Medium Sand (%) | Coarse Sand (%) | Gravel (%) | Organic Carbon (mg/kg) | Total PCBs (mg/kg) | Tri+ PCBs (mg/kg) |
|---|---|---|---|---|---|---|---|---|---|
| SSC-RS2-8887-C127F-000000 | 2.3 | 11.9 | 22.8 | 31.7 | 15.9 | 15.4 | 11000 | 5.40 | 2.99 |
| SSC-RS2-8887-C130F-000000 | 0.7 | 13.1 | 27.4 | 27 | 10.2 | 21.6 | 5200 | 5.00 | 3.01 |
| SSC-RS2-8887-138F-000000 | 1.7 | 6.9 | 17.5 | 27.3 | 26.8 | 19.8 | 9700 | 10.40 | 5.77 |
| SSC-RS2-8887-137F-000000 | 2.4 | 13.2 | 52.6 | 18 | 7.8 | 6 | 35000 | 13.70 | 7.54 |
| SSC-RS2-8887-C136F-000000 | 2.8 | 17.6 | 36.4 | 33.7 | 4.6 | 4.9 | 9900 | 6.50 | 3.22 |
| SSC-RS2-8584-C192F-000000 | 7.1 | 32.4 | 42.7 | 11.2 | 1.7 | 4.9 | 16000 | 9.30 | 3.92 |
| SSC-RS2-8685-C156F-000000 | 7.1 | 27.4 | 61.2 | 3.6 | 0.6 | 0.1 | 16000 | 12.20 | 5.56 |
| SSC-RS2-8483-C224F-000000 | 2.8 | 9.3 | 17.7 | 48 | 20 | 2.2 | 11000 | 7.00 | 3.75 |
| SSC-RS2-8685-168F-000000 | 3.4 | 8 | 14.5 | 32.1 | 10.7 | 31.3 | 3000 | 9.70 | 4.75 |
| SSC-RS2-8685-167F-000000 | 11.4 | 54.9 | 15.6 | 4.5 | 1.4 | 12.2 | 43000 | 9.90 | 4.31 |
| SSC-RS2-8685-165F-000000 | 5.8 | 58.6 | 23 | 1 | 0.3 | 11.3 | 37000 | 7.29 | 3.94 |
| SSC-RS2-8685-C170F-000000 | 1.7 | 1.1 | 24.1 | 46.3 | 12.3 | 14.5 | 2200 | 5.30 | 3.05 |
| SSC-RS2-8685-172F-000000 | 1.4 | 1.1 | 13 | 67.1 | 11 | 6.4 | 3000 | 4.50 | 2.02 |
| SSC-RS2-8685-C173F-000000 | 10.9 | 43.8 | 33.3 | 5.35 | 1.8 | 4.85 | 18000 | 10.12 | 4.43 |
| SSC-RS2-8685-181F-000000 | 0.9 | 1.3 | 19.4 | 62.7 | 10 | 5.7 | 140000 | 3.50 | 2.03 |
| SSC-RS2-8685-C175F-000000 | 5.6 | 12 | 43.7 | 32.4 | 4.9 | 1.4 | 11000 | 3.01 | 1.82 |
| SSC-RS2-8685-187F-000000 | 0.4 | 1.4 | 9.6 | 56.4 | 17.7 | 14.5 | 23000 | 7.30 | 4.03 |
| SSC-RS2-8685-185F-000000 | 1 | 1.8 | 20.85 | 75.35 | 1 | 0 | 795 | 0.87 | 0.49 |
| SSC-RS2-8786-C148F-000000 | 3.5 | 5.1 | 17.1 | 59 | 10.1 | 5.2 | 12000 | 61.40 | 15.06 |
| **Minimum** | 0.40 | 1.10 | 9.60 | 0.80 | 0.05 | 0.00 | 795 | 0.87 | 0.43 |
| **Maximum** | 16.35 | 59.50 | 72.30 | 75.35 | 26.80 | 31.30 | 220000 | 61.40 | 25.25 |
| **Average** | 5.03 | 19.94 | 37.09 | 26.45 | 5.38 | 6.12 | 26365 | 10.83 | 4.57 |

Notes:

1. Duplicate samples are averaged with parent samples.

2. Non-detects were set to zero for Aroclor PCBs and PCBs by Modified Green Bay Method (mGBM) used in Tri+ PCBs calculation. All other analytical results are above the laboratory detection limit.

mg/kg = miligrams per kilogram PCB = polychlorinated biphenyl

## Table 4-8
## Aroclor PCB Summary Statistics for Black Bass

| Species | Pool | Station Number | Count | Average (mg/kg) | Minimum (mg/kg) | Maximum (mg/kg) | 2 SE (mg/kg) |
|---|---|---|---|---|---|---|---|
| Largemouth bass | Feeder Dam | 1 | 9 | 0.05 | ND | 0.11 | 0.02 |
| | Thompson Island Pool | 3 | 1 | 1.62 | 1.62 | 1.62 | - |
| | Thompson Island Pool | 4 | 5 | 1.21 | 0.55 | 2.85 | 0.84 |
| | Thompson Island Pool | 5 | 10 | 1.73 | 0.33 | 4.73 | 0.83 |
| | Northumberland/Fort Miller | 3 | 2 | 3.52 | 2.22 | 4.82 | 2.60 |
| | Northumberland/Fort Miller | 4 | 9 | 1.69 | 0.30 | 3.59 | 0.68 |
| | Stillwater | 1 | 1 | 0.82 | 0.82 | 0.82 | - |
| | Stillwater | 2 | 3 | 1.66 | 0.58 | 2.51 | 1.14 |
| | Stillwater | 3 | 10 | 3.02 | 0.46 | 15.28 | 2.78 |
| | Stillwater | 4 | 1 | 0.99 | 0.99 | 0.99 | 0.00 |
| | Albany/Troy | 1 | 2 | 0.21 | 0.19 | 0.24 | 4.00 |
| | Catskill | 1 | 4 | 0.65 | 0.03 | 1.31 | 0.66 |
| Smallmouth bass | Feeder Dam | 1 | 11 | 0.10 | ND | 0.28 | 0.06 |
| | Thompson Island Pool | 1 | 5 | 6.76 | 2.61 | 13.38 | 3.57 |
| | Thompson Island Pool | 2 | 2 | 3.07 | 2.07 | 4.06 | 2.00 |
| | Thompson Island Pool | 3 | 4 | 2.43 | 0.51 | 3.69 | 1.41 |
| | Thompson Island Pool | 4 | 3 | 1.28 | 0.70 | 1.91 | 0.70 |
| | Northumberland/Fort Miller | 1 | 5 | 7.30 | 4.49 | 10.62 | 2.33 |
| | Northumberland/Fort Miller | 2 | 5 | 2.56 | 0.61 | 4.04 | 1.53 |
| | Northumberland/Fort Miller | 3 | 3 | 4.07 | 1.27 | 7.88 | 3.94 |
| | Northumberland/Fort Miller | 5 | 1 | 1.88 | 1.88 | 1.88 | - |
| | Stillwater | 1 | 4 | 3.94 | 2.35 | 6.30 | 1.68 |
| | Stillwater | 2 | 2 | 3.54 | 2.95 | 4.14 | 1.19 |
| | Stillwater | 4 | 4 | 1.56 | 0.96 | 2.09 | 0.49 |
| | Stillwater | 5 | 5 | 2.12 | 1.54 | 2.89 | 0.44 |
| | Albany/Troy | 1 | 18 | 1.29 | 0.25 | 2.41 | 0.32 |
| | Catskill | 1 | 16 | 0.47 | 0.14 | 1.02 | 0.13 |

Notes:
Prep – fillet
Non-detect values were set to half of the method detection limit to calculate average and 2 SE.
ND = non-detect
mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
SE = Standard Error

## Table 4-9
## Aroclor PCB Summary Statistics for Ictalurids

| Species | Pool | Station Number | Count | Average (mg/kg) | Minimum (mg/kg) | Maximum (mg/kg) | 2 SE (mg/kg) |
|---|---|---|---|---|---|---|---|
| Brown bullhead | Feeder Dam | 1 | 20 | 0.02 | ND | 0.07 | 0.01 |
| | Thompson Island Pool | 1 | 1 | 3.57 | 3.57 | 3.57 | - |
| | Thompson Island Pool | 2 | 3 | 4.18 | 1.51 | 7.93 | 3.86 |
| | Thompson Island Pool | 3 | 5 | 13.73 | 1.71 | 27.02 | 8.14 |
| | Thompson Island Pool | 5 | 18 | 3.74 | 1.98 | 7.79 | 0.62 |
| | Northumberland/Fort Miller | 1 | 10 | 9.60 | 3.00 | 20.60 | 3.96 |
| | Northumberland/Fort Miller | 3 | 5 | 3.21 | 1.49 | 5.16 | 1.53 |
| | Northumberland/Fort Miller | 5 | 10 | 2.92 | 1.54 | 5.60 | 0.87 |
| | Stillwater | 1 | 2 | 1.11 | 0.45 | 1.76 | 1.31 |
| | Stillwater | 2 | 5 | 1.89 | 1.22 | 2.63 | 0.53 |
| | Stillwater | 3 | 10 | 2.62 | 0.37 | 6.52 | 1.44 |
| | Stillwater | 4 | 5 | 1.97 | 0.77 | 0.77 | 1.03 |
| | Stillwater | 5 | 5 | 2.02 | 0.89 | 0.89 | 1.20 |
| | Catskill | 1 | 20 | 0.36 | 0.03 | 0.70 | 0.08 |
| Channel catfish | Albany/Troy | 1 | 15 | 2.49 | 0.97 | 4.44 | 0.55 |
| White catfish | Albany/Troy | 1 | 5 | 2.45 | 1.49 | 4.24 | 0.98 |
| Yellow bullhead | Thompson Island Pool | 1 | 2 | 2.75 | 1.37 | 4.13 | 2.76 |
| | Thompson Island Pool | 5 | 1 | 1.54 | 1.54 | 1.54 | - |
| | Stillwater | 3 | 3 | 4.04 | 1.33 | 7.95 | 4.00 |

Notes:
Prep – fillet
Non-detect values were set to half of the method detection limit to calculate average and 2 SE.
ND = non-detect
mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
SE = Standard Error

## Table 4-10
## Aroclor PCB Summary Statistics for Perch

| Species | Pool | Station Number | Count | Average (mg/kg) | Minimum (mg/kg) | Maximum (mg/kg) | 2 SE (mg/kg) |
|---|---|---|---|---|---|---|---|
| White perch | Albany/Troy | 1 | 20 | 0.73 | 0.18 | 2.32 | 0.23 |
| Yellow perch | Feeder Dam | 1 | 20 | 0.02 | ND | 0.08 | 0.01 |
| | Thompson Island Pool | 1 | 1 | 1.90 | 1.90 | 1.90 | - |
| | Thompson Island Pool | 3 | 5 | 6.65 | 0.99 | 10.77 | 3.49 |
| | Thompson Island Pool | 4 | 11 | 1.16 | 0.29 | 3.01 | 0.48 |
| | Thompson Island Pool | 5 | 13 | 0.94 | 0.56 | 1.45 | 0.14 |
| | Northumberland/Fort Miller | 1 | 7 | 1.71 | 0.40 | 2.47 | 0.53 |
| | Northumberland/Fort Miller | 2 | 3 | 1.07 | 0.85 | 1.42 | 0.36 |
| | Northumberland/Fort Miller | 3 | 5 | 1.55 | 0.48 | 2.39 | 0.69 |
| | Northumberland/Fort Miller | 5 | 10 | 0.89 | 0.46 | 1.16 | 0.13 |
| | Stillwater | 1 | 5 | 0.60 | 0.40 | 0.77 | 0.16 |
| | Stillwater | 2 | 5 | 0.67 | 0.58 | 0.86 | 0.10 |
| | Stillwater | 3 | 14 | 0.51 | 0.14 | 1.21 | 0.21 |
| | Stillwater | 4 | 4 | 0.42 | 0.26 | 0.79 | 0.25 |
| | Stillwater | 5 | 2 | 0.57 | 0.31 | 0.84 | 0.53 |

Notes:
Prep – fillet
Non-detect values were set to half of the method detection limit to calculate average and 2 SE.
ND = non-detect
mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
SE = Standard Error

**Table 4-11**
**Aroclor PCB Summary Statistics for Striped Bass**

| Species | Pool | Station Number | Count | Average (mg/kg) | Minimum (mg/kg) | Maximum (mg/kg) | 2 SE (mg/kg) |
|---|---|---|---|---|---|---|---|
| Striped bass | Albany/Troy | 1 | 20 | 0.96 | 0.07 | 4.28 | 0.59 |
| | Catskill | 1 | 20 | 0.22 | ND | 0.58 | 0.07 |
| | Tappan Zee | 1 | 12 | 0.25 | 0.03 | 0.73 | 0.11 |

Notes:
Prep – fillet
Non-detect values were set to half of the method detection limit to calculate average and 2 SE.
ND = non-detect
mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
SE = Standard Error

**Table 4-12**
**Aroclor PCB Summary Statistics for Pumpkinseed**

| Pool | Station Number | Count | Average (mg/kg) | Minimum (mg/kg) | Maximum (mg/kg) | 2 SE (mg/kg) |
|---|---|---|---|---|---|---|
| Feeder Dam | 1 | 20 | 0.02 | ND | ND | 0.00 |
| Thompson Island Pool | 1 | 5 | 11.96 | 4.48 | 21.96 | 6.30 |
| Thompson Island Pool | 2 | 5 | 5.95 | 4.42 | 15.59 | 4.87 |
| Thompson Island Pool | 3 | 5 | 32.13 | 20.77 | 46.50 | 9.41 |
| Thompson Island Pool | 4 | 5 | 6.79 | 3.92 | 9.71 | 2.01 |
| Thompson Island Pool | 5 | 10 | 7.81 | 6.02 | 12.82 | 1.22 |
| Northumberland/Fort Miller | 1 | 3 | 8.88 | 4.44 | 16.74 | 7.88 |
| Northumberland/Fort Miller | 2 | 5 | 9.15 | 5.17 | 14.89 | 3.19 |
| Northumberland/Fort Miller | 3 | 7 | 4.26 | 3.33 | 6.15 | 0.68 |
| Northumberland/Fort Miller | 5 | 10 | 5.94 | 2.16 | 9.20 | 1.18 |
| Stillwater | 1 | 5 | 3.16 | 0.23 | 6.77 | 2.12 |
| Stillwater | 2 | 5 | 4.23 | 2.52 | 6.35 | 1.45 |
| Stillwater | 3 | 5 | 1.28 | 0.89 | 1.52 | 0.27 |
| Stillwater | 4 | 5 | 2.71 | 2.26 | 3.49 | 0.42 |
| Stillwater | 5 | 10 | 3.63 | 1.22 | 7.32 | 0.97 |
| Albany/Troy | 1 | 20 | 1.13 | 0.64 | 1.95 | 0.14 |

Notes:
Prep – whole body
Non-detect values were set to half of the method detection limit to calculate average and 2 SE.
ND = non-detect
mg/kg = milligrams per kilogram
PCB = polychlorinated biphenyl
SE = Standard Error

## Table 4-13
## Aroclor PCB Summary Statistics for Forage Fish

| Species | Pool | Station Number | Count | Average (mg/kg) | Minimum (mg/kg) | Maximum (mg/kg) | 2 SE (mg/kg) |
|---|---|---|---|---|---|---|---|
| Forage fish | Feeder Dam | 1 | 10 | 0.03 | ND | 0.06 | 0.01 |
| | Thompson Island Pool | 1 | 2 | 2.71 | 1.79 | 3.63 | 1.84 |
| | Thompson Island Pool | 2 | 2 | 1.46 | 1.29 | 1.63 | 0.34 |
| | Thompson Island Pool | 3 | 2 | 2.42 | 2.23 | 2.62 | 0.39 |
| | Thompson Island Pool | 4 | 2 | 4.16 | 2.06 | 6.26 | 4.20 |
| | Thompson Island Pool | 5 | 2 | 11.14 | 5.04 | 17.24 | 12.20 |
| | Northumberland/Fort Miller | 1 | 2 | 5.72 | 5.34 | 6.11 | 0.78 |
| | Northumberland/Fort Miller | 2 | 2 | 5.95 | 3.11 | 8.79 | 5.68 |
| | Northumberland/Fort Miller | 3 | 2 | 7.63 | 5.51 | 9.75 | 4.24 |
| | Northumberland/Fort Miller | 5 | 4 | 2.38 | 1.29 | 3.34 | 1.06 |
| | Stillwater | 1 | 2 | 2.14 | 1.90 | 2.38 | 0.48 |
| | Stillwater | 2 | 2 | 6.67 | 6.26 | 7.07 | 0.81 |
| | Stillwater | 3 | 2 | 1.37 | 1.23 | 1.50 | 0.27 |
| | Stillwater | 4 | 2 | 4.32 | 4.10 | 4.54 | 0.45 |
| | Stillwater | 5 | 2 | 2.84 | 0.73 | 4.95 | 4.22 |
| | Albany/Troy | 1 | 10 | 1.43 | 0.88 | 2.61 | 0.44 |

Notes:

Prep – whole body (composite)

Non-detect values were set to half of the method detection limit to calculate average and 2 SE.

Forage Fish = golden shiner, spottail shiner, fallfish, bluntnose minnow, and mimic shiner

**Table 4-14**
**Percent Lipid Summary Statistics for Black Bass**

| Species | Pool | Station Number | Count | Average % | Minimum % | Maximum % | 2 SE % |
|---|---|---|---|---|---|---|---|
| Largemouth bass | Feeder Dam | 1 | 9 | 0.46 | 0.30 | 0.81 | 0.11 |
| | Thompson Island Dam | 3 | 1 | 0.22 | 0.22 | 0.22 | - |
| | Thompson Island Dam | 4 | 5 | 0.24 | 0.12 | 0.48 | 0.14 |
| | Thompson Island Dam | 5 | 10 | 0.39 | 0.09 | 0.87 | 0.16 |
| | Northumberland/Fort Miller | 3 | 2 | 0.40 | 0.20 | 0.61 | 0.41 |
| | Northumberland/Fort Miller | 5 | 9 | 0.37 | 0.27 | 0.74 | 0.10 |
| | Stillwater | 1 | 1 | 0.35 | 0.35 | 0.35 | - |
| | Stillwater | 2 | 3 | 0.38 | 0.32 | 0.43 | 0.07 |
| | Stillwater | 3 | 10 | 0.60 | 0.29 | 1.35 | 0.20 |
| | Stillwater | 4 | 1 | 0.47 | 0.47 | 0.47 | - |
| | Albany/Troy | 1 | 2 | 0.34 | 0.28 | 0.40 | 0.12 |
| | Catskill | 1 | 4 | 0.75 | 0.34 | 1.14 | 0.43 |
| Smallmouth bass | Feeder Dam | 1 | 11 | 0.58 | 0.37 | 0.79 | 0.07 |
| | Thompson Island Dam | 1 | 5 | 0.63 | 0.40 | 0.96 | 0.19 |
| | Thompson Island Dam | 2 | 2 | 0.29 | 0.27 | 0.32 | 0.05 |
| | Thompson Island Dam | 3 | 4 | 0.50 | 0.34 | 0.69 | 0.14 |
| | Thompson Island Dam | 4 | 3 | 0.40 | 0.30 | 0.49 | 0.11 |
| | Northumberland/Fort Miller | 1 | 5 | 0.68 | 0.42 | 1.15 | 0.28 |
| | Northumberland/Fort Miller | 2 | 5 | 0.78 | 0.40 | 0.94 | 0.19 |
| | Northumberland/Fort Miller | 3 | 3 | 0.47 | 0.40 | 0.52 | 0.07 |
| | Northumberland/Fort Miller | 5 | 1 | 0.66 | 0.66 | 0.66 | - |
| | Stillwater | 1 | 4 | 1.02 | 0.69 | 1.34 | 0.32 |
| | Stillwater | 2 | 2 | 0.52 | 0.45 | 0.60 | 0.15 |
| | Stillwater | 4 | 4 | 0.51 | 0.39 | 0.63 | 0.13 |
| | Stillwater | 5 | 5 | 0.65 | 0.36 | 0.91 | 0.20 |
| | Albany/Troy | 1 | 18 | 0.60 | 0.17 | 1.21 | 0.15 |
| | Catskill | 1 | 16 | 0.43 | 0.07 | 0.96 | 0.15 |

Notes:
Prep – fillet
SE = Standard Error

**Table 4-15**
**Percent Lipid Summary Statistics for Ictalurids**

| Species | Pool | Station Number | Count | Average % | Minimum % | Maximum % | 2 SE % |
|---|---|---|---|---|---|---|---|
| Brown bullhead | Feeder Dam | 1 | 20 | 1.19 | 0.49 | 2.12 | 0.19 |
| | Thompson Island Pool | 1 | 1 | 2.36 | 2.36 | 2.36 | - |
| | Thompson Island Pool | 2 | 3 | 1.42 | 0.35 | 3.03 | 1.64 |
| | Thompson Island Pool | 3 | 5 | 1.12 | 0.48 | 1.67 | 0.48 |
| | Thompson Island Pool | 5 | 18 | 1.10 | 0.39 | 2.40 | 0.24 |
| | Northumberland/Fort Miller | 1 | 10 | 1.59 | 0.55 | 3.17 | 0.51 |
| | Northumberland/Fort Miller | 3 | 5 | 1.79 | 0.83 | 3.47 | 0.89 |
| | Northumberland/Fort Miller | 5 | 10 | 1.14 | 0.37 | 1.60 | 0.21 |
| | Stillwater | 1 | 2 | 0.61 | 0.40 | 0.82 | 0.42 |
| | Stillwater | 2 | 5 | 1.70 | 1.20 | 2.67 | 0.57 |
| | Stillwater | 3 | 10 | 2.66 | 1.32 | 6.00 | 0.84 |
| | Stillwater | 4 | 5 | 1.94 | 1.18 | 3.16 | 0.66 |
| | Stillwater | 5 | 5 | 1.42 | 0.44 | 3.23 | 0.99 |
| | Catskill | 1 | 20 | 1.89 | 0.35 | 3.42 | 0.44 |
| Channel catfish | Albany/Troy | 1 | 15 | 5.30 | 2.84 | 10.70 | 1.35 |
| White catfish | Albany/Troy | 1 | 5 | 5.22 | 2.10 | 8.18 | 1.97 |
| Yellow bullhead | Thompson Island Pool | 1 | 2 | 0.45 | 0.34 | 0.57 | 0.23 |
| | Thompson Island Pool | 5 | 1 | 0.73 | 0.73 | 0.73 | - |
| | Stillwater | 1 | 3 | 1.80 | 1.19 | 2.83 | 1.04 |

Notes:
Prep – fillet
SE = Standard Error

**Table 4-16**
**Percent Lipid Summary Statistics for Perch**

| Species | Pool | Station Number | Count | Average % | Minimum % | Maximum % | 2 SE % |
|---|---|---|---|---|---|---|---|
| White perch | Albany/Troy | 1 | 20 | 0.91 | 0.20 | 2.53 | 0.24 |
| Yellow perch | Feeder Dam | 1 | 20 | 0.85 | 0.25 | 1.55 | 0.11 |
| | Thompson Island Pool | 1 | 1 | 0.16 | 0.16 | 0.16 | - |
| | Thompson Island Pool | 3 | 5 | 0.70 | 0.35 | 1.16 | 0.29 |
| | Thompson Island Pool | 4 | 11 | 0.42 | 0.08 | 0.77 | 0.11 |
| | Thompson Island Pool | 5 | 13 | 0.39 | 0.17 | 0.78 | 0.09 |
| | Northumberland/Fort Miller | 1 | 7 | 0.68 | 0.52 | 0.84 | 0.09 |
| | Northumberland/Fort Miller | 2 | 3 | 0.49 | 0.33 | 0.68 | 0.21 |
| | Northumberland/Fort Miller | 3 | 5 | 0.44 | 0.29 | 0.67 | 0.14 |
| | Northumberland/Fort Miller | 5 | 10 | 0.46 | 0.28 | 0.87 | 0.11 |
| | Stillwater | 1 | 5 | 0.71 | 0.54 | 0.85 | 0.10 |
| | Stillwater | 2 | 5 | 0.48 | 0.36 | 0.65 | 0.10 |
| | Stillwater | 3 | 14 | 0.85 | 0.50 | 1.22 | 0.12 |
| | Stillwater | 4 | 4 | 0.67 | 0.15 | 0.93 | 0.35 |
| | Stillwater | 5 | 2 | 0.73 | 0.42 | 1.05 | 0.63 |

Notes:
Prep – fillet
SE = Standard Error

**Table 4-17**
**Percent Lipid Summary Statistics for Striped Bass**

| Pool | Station Number | Count | Average % | Minimum % | Maximum % | 2 SE % |
|---|---|---|---|---|---|---|
| Albany/Troy | 1 | 20 | 1.87 | 0.48 | 4.83 | 0.51 |
| Catskill | 1 | 20 | 2.07 | 0.59 | 4.20 | 0.51 |
| Tappan Zee | 1 | 12 | 2.09 | 0.58 | 4.43 | 0.60 |

Notes:
Prep – fillet
SE = Standard Error

**Table 4-18**
**Percent lipid Summary Statistics for Pumpkinseed**

| Pool | Station Number | Count | Average % | Minimum % | Maximum % | 2 SE % |
|---|---|---|---|---|---|---|
| Feeder Dam | 1 | 20 | 2.11 | 0.50 | 3.28 | 0.33 |
| Thompson Island Pool | 1 | 5 | 2.86 | 1.96 | 3.35 | 0.49 |
| Thompson Island Pool | 2 | 5 | 2.98 | 2.54 | 3.30 | 0.26 |
| Thompson Island Pool | 3 | 5 | 2.41 | 2.06 | 2.74 | 0.23 |
| Thompson Island Pool | 4 | 5 | 3.32 | 2.58 | 4.07 | 0.53 |
| Thompson Island Pool | 5 | 10 | 3.16 | 2.60 | 4.20 | 0.29 |
| Northumberland/Fort Miller | 1 | 3 | 4.46 | 3.85 | 5.09 | 0.72 |
| Northumberland/Fort Miller | 2 | 5 | 4.77 | 3.68 | 6.98 | 1.17 |
| Northumberland/Fort Miller | 3 | 7 | 3.50 | 3.10 | 3.96 | 0.22 |
| Northumberland/Fort Miller | 5 | 10 | 2.68 | 1.38 | 3.94 | 0.44 |
| Stillwater | 1 | 5 | 4.73 | 2.97 | 6.36 | 1.07 |
| Stillwater | 2 | 5 | 3.89 | 3.14 | 5.30 | 0.75 |
| Stillwater | 3 | 5 | 2.31 | 1.44 | 2.76 | 0.46 |
| Stillwater | 4 | 5 | 2.42 | 1.99 | 2.76 | 0.29 |
| Stillwater | 5 | 10 | 3.51 | 1.52 | 7.42 | 0.98 |
| Albany/Troy | 1 | 20 | 3.13 | 1.95 | 4.71 | 0.35 |

Notes:
Prep – whole body
SE = Standard Error

**Table 4-19**
**Percent Lipid Summary Statistics for Forage Fish**

| Pool | Station Number | Count | Average % | Minimum % | Maximum % | 2 SE % |
|---|---|---|---|---|---|---|
| Feeder Dam | 1 | 10 | 3.59 | 2.11 | 5.76 | 0.68 |
| Thompson Island Pool | 1 | 2 | 2.57 | 2.34 | 2.79 | 0.45 |
| Thompson Island Pool | 2 | 2 | 2.74 | 2.59 | 2.88 | 0.29 |
| Thompson Island Pool | 3 | 2 | 2.31 | 1.94 | 2.68 | 0.74 |
| Thompson Island Pool | 4 | 2 | 2.07 | 1.28 | 2.85 | 1.57 |
| Thompson Island Pool | 5 | 2 | 4.51 | 2.02 | 6.99 | 4.97 |
| Northumberland/Fort Miller | 1 | 2 | 2.24 | 2.13 | 2.35 | 0.22 |
| Northumberland/Fort Miller | 2 | 2 | 3.91 | 2.98 | 4.84 | 1.86 |
| Northumberland/Fort Miller | 3 | 2 | 4.85 | 4.16 | 5.54 | 1.38 |
| Northumberland/Fort Miller | 5 | 4 | 1.94 | 1.53 | 2.66 | 0.51 |
| Stillwater | 1 | 2 | 3.56 | 3.47 | 3.65 | 0.18 |
| Stillwater | 2 | 2 | 4.47 | 3.95 | 5.00 | 1.05 |
| Stillwater | 3 | 2 | 3.71 | 3.40 | 4.02 | 0.62 |
| Stillwater | 4 | 2 | 3.11 | 2.89 | 3.32 | 0.43 |
| Stillwater | 5 | 2 | 2.96 | 0.92 | 5.01 | 4.09 |
| Albany/Troy | 1 | 10 | 3.19 | 1.31 | 6.26 | 1.09 |

Notes:
Prep – whole body (composite)
Forage fish = golden shiner, spottail shiner, fallfish, bluntnose minnow, and mimic shiner
SE = Standard Error

**Table 4-20**
**Sex Summary for Black Bass**

| Species | Pool | Total Count | Count of Males | Count of Females | Count of Unknowns |
|---|---|---|---|---|---|
| Largemouth bass | Feeder Dam | 9 | 3 | 6 | 0 |
| | Thompson Island Pool | 16 | 6 | 9 | 1 |
| | Northumberland/Fort Miller | 11 | 5 | 6 | 0 |
| | Stillwater | 15 | 9 | 6 | 0 |
| | Albany/Troy | 2 | 0 | 2 | 0 |
| | Catskill | 4 | 3 | 1 | 0 |
| Smallmouth bass | Feeder Dam | 11 | 2 | 9 | 0 |
| | Thompson Island Pool | 14 | 6 | 8 | 0 |
| | Northumberland/Fort Miller | 14 | 10 | 4 | 0 |
| | Stillwater | 15 | 14 | 1 | 0 |
| | Albany/Troy | 18 | 8 | 10 | 0 |
| | Catskill | 16 | 6 | 10 | 0 |

**Table 4-21**
**Sex Summary for Ictalurids**

| Species | Pool | Total Count | Count of Males | Count of Females | Count of Unknowns |
|---|---|---|---|---|---|
| Brown bullhead | Feeder Dam | 20 | 10 | 10 | 0 |
| | Thompson Island Pool | 27 | 13 | 14 | 0 |
| | Northumberland/Fort Miller | 25 | 14 | 11 | 0 |
| | Stillwater | 27 | 14 | 11 | 2 |
| | Catskill | 20 | 9 | 11 | 0 |
| Channel catfish | Albany/Troy | 15 | 8 | 7 | 0 |
| White catfish | Albany/Troy | 5 | 2 | 3 | 0 |
| Yellow bullhead | Thompson Island Pool | 3 | 1 | 0 | 2 |
| | Stillwater | 3 | 0 | 1 | 2 |

**Table 4-22**
**Sex Summary for Perch**

| Species | Pool | Total Count | Count of Males | Count of Females | Count of Unknowns |
|---|---|---|---|---|---|
| White perch | Albany/Troy | 20 | 5 | 9 | 6 |
| Yellow perch | Feeder Dam | 20 | 12 | 4 | 4 |
| | Thompson Island Pool | 30 | 13 | 5 | 12 |
| | Northumberland/Fort Miller | 25 | 15 | 8 | 2 |
| | Stillwater | 30 | 10 | 12 | 8 |

**Table 4-23**
**Sex Summary for Striped Bass**

| Species | Pool | Total Count | Count of Males | Count of Females | Count of Unknowns |
|---|---|---|---|---|---|
| Striped bass | Albany/Troy | 20 | 8 | 12 | 0 |
| | Catskill | 20 | 2 | 18 | 0 |
| | Tappan Zee | 12 | 2 | 10 | 0 |

**Table 4-24**

**Results for Analysis of Wild Celery (*Vallisineria americana* )**

| Certification Unit | Depth | Total PCBs (mg/kg) |
|---|---|---|
| 55 | Above ground | 0.425 |
| 55 | Below ground | 0.470 |
| 56 | Above ground | 0.210 |
| 56 | Below ground | 0.185 |
| 58 | Above ground | 0.140 |
| 58 | Below ground | 0.128 |

Notes:

mg/kg = milligrams per kilogram

PCB = polychlorinated biphenyl

## Table 5-1

## Summary of Analytical Data Quality for 2012 RAMP Aqueous Environmental Samples[1]

| Analysis Fraction | Number of Results Qualified[2] | | | | | | | | | | Total Number of Results[5] | Percent Completeness[6] | Percent Unusable Data[7] | Percent Usable Data[8] | Qualitative Data Quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Unqualified Positive Results | U | <J[3] | UB | JN | J | J[4] | UJ | R | UR | | | | | |
| Aroclor PCBs (NE273_02) | 1,275 | 5,193 | NA | 0 | 0 | 491 | 272 | 137 | 0 | 8 | 7,104 | 94.7% | 0.1% | 99.9% | Excellent |
| mGBM PCBs (NE294_00/ NE294_00A and NE293_00) | 3,008 | 10,835 | 25 | 2,724 | 0 | 2,774 | 2,561 | 128 | 0 | 0 | 19,494 | 81.9% | 0.0% | 100% | Good |
| Total metals (200.8 SLCH) | 7 | 4 | NA | 2 | 0 | 3 | 2 | 0 | 0 | 0 | 16 | 78.6% | 0.0% | 100% | Good |
| Dissolved metals (200.8 SL) | 0 | 4 | NA | 3 | 0 | 1 | 1 | 0 | 0 | 0 | 8 | 57.1% | 0.0% | 100% | Average |
| Hardness (SM 2340B) | 4 | 0 | NA | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 4 | 100% | 0.0% | 100% | Excellent |
| Total suspended solids (SM 2540D) | 602 | 74 | NA | 21 | 0 | 266 | 4 | 32 | 0 | 0 | 995 | 68.2% | 0.0% | 100% | Above average |
| Total organic carbon (SM 5310B) | 55 | 0 | NA | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 55 | 100% | 0.0% | 100% | Excellent |
| Entire RAMP water sample dataset | 4,951 | 16,110 | 25 | 2,750 | 0 | 3,535 | 2,840 | 297 | 0 | 8 | 27,676 | 84.9% | 0.03% | 99.97% | Very good |

Notes:

1. Summary is for water environmental samples and does not include results from field duplicates, field blanks, lab duplicates, matrix spikes, or blanks. Summary is based on qualification of data from verification and validation.

2. Results are the number of individual analytes in the analysis fraction. For example, there are eight analytes in the PCB Aroclor analysis fraction (by NE273_02).

3. Results for Total PCBs, where the sum of the positive PCB congener results was greater than 0 but below the sample-specific Total PCB method detection limit (MDL).

4. Results qualified as estimates due to being below the reporting limit. For example, of the 491 NE273_02 PCB congener results that were qualified J, 272 results were qualified J due to being below the reporting limit.

5. Total number of results is the summation of all qualified and unqualified results.

6. The % completeness is the sum of results that were valid as reported [unqualified positive results + U]/total number of results - $<J^3$ - $J^4$.

7. The % unusable data is the sum of the results qualified R + UR/total number of results.

8. The % usable data is the sum of the unqualified positive results + U [+<J for total PCBs] + UB + J + JN + UJ/total number of results.

mGBM = Modified Green Bay Method
PCB = polychlorinated biphenyl
RAMP = Remedial Action Monitoring Program

## Table 5-2
## Summary of Analytical Data Quality for 2012 RAMP Fish Tissue Environmental Samples[1]

| Analysis Fraction | Number of Results Qualified[2] | | | | | | | | | | Total Number of Results[5] | Percent Completeness[6] | Percent Unusable Data[7] | Percent Usable Data[8] | Qualitative Data Quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Unqualified Positive Results | U | <J[3] | U* | JN | J | J[4] | UJ | R | UR | | | | | |
| PCBs as Aroclors (NE148_08[9]) | 2,245 | 2,703 | 0 | 0 | 0 | 188 | 154 | 0 | 0 | 0 | 5,136 | 99.3% | 0.0% | 100% | Excellent |
| Lipids (NE158_05[10]) | 636 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 642 | 99.1% | 0.0% | 100% | Excellent |
| Entire fish tissue dataset | 2,881 | 2,703 | 0 | 0 | 0 | 194 | 154 | 0 | 0 | 0 | 5,778 | 99.3% | 0.0% | 100% | Excellent |

Notes:

1. Summary is for fish tissue environmental samples and does not include results from lab duplicates, matrix spikes or blanks. Summary is based on qualification of data from verification and validation.

2. Results are the number of individual analytes in the analysis fraction. For example, there are eight analytes in the Total PCBs as Aroclors analysis fraction.

3. Results for Total PCBs where the sum of the positive PCB congener results was greater than 0 but below the sample-specific Total PCB method detection limit (MDL).

4. Results qualified as estimates due to being below the reporting limit. For example, of the 188 NE148_08 results that were qualified J, 154 results were qualified J due to being below the reporting limit.

5. Total number of results is the summation of all qualified and unqualified results.

6. The % completeness is the sum of results that were valid as reported [Unqualified Positive Results + U]/Total Number of Results - <J[3] - J[4].

7. The % unusable data is the sum of the results qualified R + UR/total number of results.

8. The % usable data is the sum of the unqualified positive results + U [+<J for total PCBs] + U* + J + JN + UJ/total number of results.

9. The analytical method "NE148_04," as designated in the database, indicates a sample analyzed by NE148_08. The designation "NE148_04" was used in the database due to a valid value limitation.

10. The analytical method "NE158_03," as designated in the database, indicates a sample analyzed by NE158_05. The designation "NE158_03" was used in the database due to a valid value limitation.

PCB = polychlorinated biphenyl

RAMP = Remedial Action Monitoring Program

## Table 5-3

## Summary of Analytical Data Quality for 2012 RAMP Downstream Deposition Study Sediment Environmental Samples[1]

| Analysis Fraction | Number of Results Qualified[2] | | | | | | | | | | Total Number of Results[5] | Percent Completeness[6] | Percent Unusable Data[7] | Percent Usable Data[8] | Qualitative Data Quality |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Unqualified Positive Results | U | <J[3] | U* | JN | J | J[4] | UJ | R | UR | | | | | |
| PCBs as Aroclors (GEHR8082) | 254 | 421 | 0 | 0 | 0 | 40 | 0 | 53 | 0 | 0 | 768 | 87.9% | 0.0% | 100% | Very good |
| Total organic carbon (Lloyd Kahn) | 56 | 0 | 0 | 0 | 0 | 40 | 0 | 0 | 0 | 0 | 96 | 58.3% | 0.0% | 100% | Average |
| Entire DDS sediment dataset | 310 | 421 | 0 | 0 | 0 | 80 | 0 | 53 | 0 | 0 | 864 | 84.6% | 0.0% | 100% | Very good |

Notes:

1. Summary is for downstream deposition study sediment environmental samples and does not include results from blanks or performance evaluation samples. Summary is based on qualification of data from verification and validation.

2. Results are the number of individual analytes in the analysis fraction. For example, there are eight analytes in the Total PCBs as Aroclors analysis fraction.

3. Results for Total PCBs where the sum of the positive PCB congener results was greater than 0 but below the sample-specific Total PCB method detection limit (MDL).

4. Results qualified as estimates due to being below the reporting limit. For example, of the 40 GEHR8082 results that were qualified J, 0 results were qualified J due to being below the reporting limit.

5. Total number of results is the summation of all qualified and unqualified results.

6. The % completeness is the sum of results that were valid as reported [Unqualified Positive Results + U]/Total Number of Results - $<J^3$ - $J^4$.

7. The % unusable data is the sum of the results qualified R + UR/total number of results.

8. The % usable data is the sum of the unqualified positive results + U [+<J for total PCBs] + U* + J + JN + UJ/total number of results.

DDS = Downstream Deposition Study

PCB = polychlorinated biphenyl

RAMP = Remedial Action Monitoring Program

**Table 5-4**

**Summary of RAMP Water Field Duplicate Results for the Modified Green Bay Method in 2012**

| Method | Matrix | Analyte | Total Number Field Duplicate Pairs | Total Number Field Duplicate Pairs with NDs for Both Samples | Total Number Field Duplicate Pairs with Positives in Either Sample | | | | | Overall Percent Meet Criteria |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Total Number | Number Meet Criteria | Number Do Not Meet Criteria | Percent Meet Criteria | Percent Do Not Meet Criteria | |
| NE294_00 | Water | Total PCB | 35 | 1 | 34 | 33 | 1 | 97 | 3 | 97 |
| NE294_00 | Water | Peak 2 | 35 | 0 | 35 | 33 | 2 | 94 | 6 | 94 |
| NE294_00 | Water | Peak 3 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 4 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 5-4 | 35 | 0 | 35 | 33 | 2 | 94 | 6 | 94 |
| NE294_00 | Water | Peak 5-10 | 35 | 1 | 34 | 34 | 0 | 100 | 0 | 100 |
| NE294_00 | Water | Peak 6 | 35 | 14 | 21 | 20 | 1 | 95 | 5 | 97 |
| NE294_00 | Water | Peak 7 | 35 | 28 | 7 | 7 | 0 | 100 | 0 | 100 |
| NE294_00 | Water | Peak 8 | 35 | 6 | 29 | 28 | 1 | 97 | 3 | 97 |
| NE294_00 | Water | Peak 9 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 10 | 35 | 3 | 32 | 31 | 1 | 97 | 3 | 97 |
| NE294_00 | Water | Peak 11 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 12 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 13 | 35 | 19 | 16 | 13 | 3 | 81 | 19 | 91 |
| NE294_00 | Water | Peak 14 | 35 | 1 | 34 | 33 | 1 | 97 | 3 | 97 |
| NE294_00 | Water | Peak 15 | 35 | 3 | 32 | 30 | 2 | 94 | 6 | 94 |
| NE294_00 | Water | Peak 16 | 35 | 1 | 34 | 33 | 1 | 97 | 3 | 97 |
| NE294_00 | Water | Peak 17 | 35 | 2 | 33 | 32 | 1 | 97 | 3 | 97 |
| NE294_00 | Water | Peak 19 | 35 | 11 | 24 | 24 | 0 | 100 | 0 | 100 |
| NE294_00 | Water | Peak 20 | 35 | 11 | 24 | 15 | 9 | 63 | 38 | 74 |
| NE294_00 | Water | Peak 21 | 35 | 7 | 28 | 25 | 3 | 89 | 11 | 91 |
| NE294_00 | Water | Peak 22 | 35 | 22 | 13 | 11 | 2 | 85 | 15 | 94 |
| NE294_00 | Water | Peak 23 | 35 | 1 | 34 | 33 | 1 | 97 | 3 | 97 |
| NE294_00 | Water | Peak 24 | 35 | 6 | 29 | 28 | 1 | 97 | 3 | 97 |
| NE294_00 | Water | Peak 25 | 35 | 9 | 26 | 25 | 1 | 96 | 4 | 97 |
| NE294_00 | Water | Peak 26 | 35 | 0 | 35 | 33 | 2 | 94 | 6 | 94 |

**Table 5-4**

**Summary of RAMP Water Field Duplicate Results for the Modified Green Bay Method in 2012**

| Method | Matrix | Analyte | Total Number Field Duplicate Pairs | Total Number Field Duplicate Pairs with NDs for Both Samples | Total Number Field Duplicate Pairs with Positives in Either Sample | | | | | Overall Percent Meet Criteria |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Total Number | Number Meet Criteria | Number Do Not Meet Criteria | Percent Meet Criteria | Percent Do Not Meet Criteria | |
| NE294_00 | Water | Peak 27 | 35 | 23 | 12 | 9 | 3 | 75 | 25 | 91 |
| NE294_00 | Water | Peak 28 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 29 | 35 | 9 | 26 | 21 | 5 | 81 | 19 | 86 |
| NE294_00 | Water | Peak 30 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 31 | 35 | 0 | 35 | 33 | 2 | 94 | 6 | 94 |
| NE294_00 | Water | Peak 32 | 35 | 0 | 35 | 33 | 2 | 94 | 6 | 94 |
| NE294_00 | Water | Peak 33 | 35 | 18 | 17 | 15 | 2 | 88 | 12 | 94 |
| NE294_00 | Water | Peak 34 | 35 | 22 | 13 | 12 | 1 | 92 | 8 | 97 |
| NE294_00 | Water | Peak 35 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 36 | 35 | 33 | 2 | 2 | 0 | 100 | 0 | 100 |
| NE294_00 | Water | Peak 37 | 35 | 3 | 32 | 31 | 1 | 97 | 3 | 97 |
| NE294_00 | Water | Peak 38 | 35 | 4 | 31 | 29 | 2 | 94 | 6 | 94 |
| NE294_00 | Water | Peak 39 | 35 | 2 | 33 | 31 | 2 | 94 | 6 | 94 |
| NE294_00 | Water | Peak 41 | 35 | 10 | 25 | 25 | 0 | 100 | 0 | 100 |
| NE294_00 | Water | Peak 42 | 35 | 6 | 29 | 27 | 2 | 93 | 7 | 94 |
| NE294_00 | Water | Peak 43 | 35 | 9 | 26 | 26 | 0 | 100 | 0 | 100 |
| NE294_00 | Water | Peak 44 | 35 | 27 | 8 | 5 | 3 | 63 | 38 | 91 |
| NE294_00 | Water | Peak 45 | 35 | 12 | 23 | 11 | 12 | 48 | 52 | 66 |
| NE294_00 | Water | Peak 46 | 35 | 4 | 31 | 30 | 1 | 97 | 3 | 97 |
| NE294_00 | Water | Peak 47 | 35 | 16 | 19 | 18 | 1 | 95 | 5 | 97 |
| NE294_00 | Water | Peak 48 | 35 | 3 | 32 | 31 | 1 | 97 | 3 | 97 |
| NE294_00 | Water | Peak 49 | 35 | 30 | 5 | 3 | 2 | 60 | 40 | 94 |
| NE294_00 | Water | Peak 50 | 35 | 5 | 30 | 29 | 1 | 97 | 3 | 97 |
| NE294_00 | Water | Peak 51 | 35 | 20 | 15 | 12 | 3 | 80 | 20 | 91 |
| NE294_00 | Water | Peak 52 | 35 | 9 | 26 | 24 | 2 | 92 | 8 | 94 |
| NE294_00 | Water | Peak 53 | 35 | 4 | 31 | 30 | 1 | 97 | 3 | 97 |

**Table 5-4**

**Summary of RAMP Water Field Duplicate Results for the Modified Green Bay Method in 2012**

| Method | Matrix | Analyte | Total Number Field Duplicate Pairs | Total Number Field Duplicate Pairs with NDs for Both Samples | Total Number Field Duplicate Pairs with Positives in Either Sample | | | | | Overall Percent Meet Criteria |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Total Number | Number Meet Criteria | Number Do Not Meet Criteria | Percent Meet Criteria | Percent Do Not Meet Criteria | |
| NE294_00 | Water | Peak 54 | 35 | 9 | 26 | 24 | 2 | 92 | 8 | 94 |
| NE294_00 | Water | Peak 55 | 35 | 24 | 11 | 6 | 5 | 55 | 45 | 86 |
| NE294_00 | Water | Peak 56 | 35 | 24 | 11 | 7 | 4 | 64 | 36 | 89 |
| NE294_00 | Water | Peak 57 | 35 | 33 | 2 | 2 | 0 | 100 | 0 | 100 |
| NE294_00 | Water | Peak 58 | 35 | 9 | 26 | 24 | 2 | 92 | 8 | 94 |
| NE294_00 | Water | Peak 59 | 35 | 9 | 26 | 24 | 2 | 92 | 8 | 94 |
| NE294_00 | Water | Peak 60 | 35 | 7 | 28 | 27 | 1 | 96 | 4 | 97 |
| NE294_00 | Water | Peak 61 | 35 | 7 | 28 | 26 | 2 | 93 | 7 | 94 |
| NE294_00 | Water | Peak 62 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 63 | 35 | 23 | 12 | 10 | 2 | 83 | 17 | 94 |
| NE294_00 | Water | Peak 64 | 35 | 4 | 31 | 31 | 0 | 100 | 0 | 100 |
| NE294_00 | Water | Peak 65 | 35 | 14 | 21 | 19 | 2 | 90 | 10 | 94 |
| NE294_00 | Water | Peak 66 | 35 | 30 | 5 | 5 | 0 | 100 | 0 | 100 |
| NE294_00 | Water | Peak 67 | 35 | 20 | 15 | 11 | 4 | 73 | 27 | 89 |
| NE294_00 | Water | Peak 68 | 35 | 26 | 9 | 9 | 0 | 100 | 0 | 100 |
| NE294_00 | Water | Peak 69 | 35 | 13 | 22 | 22 | 0 | 100 | 0 | 100 |
| NE294_00 | Water | Peak 70 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 71 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 72 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 73 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 74 | 35 | 9 | 26 | 25 | 1 | 96 | 4 | 97 |
| NE294_00 | Water | Peak 75 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 76 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 77 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 78 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 79 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |

**Table 5-4**

**Summary of RAMP Water Field Duplicate Results for the Modified Green Bay Method in 2012**

| Method | Matrix | Analyte | Total Number Field Duplicate Pairs | Total Number Field Duplicate Pairs with NDs for Both Samples | Total Number Field Duplicate Pairs with Positives in Either Sample | | | | | Overall Percent Meet Criteria |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Total Number | Number Meet Criteria | Number Do Not Meet Criteria | Percent Meet Criteria | Percent Do Not Meet Criteria | |
| NE294_00 | Water | Peak 80 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 82 | 35 | 8 | 27 | 27 | 0 | 100 | 0 | 100 |
| NE294_00 | Water | Peak 83 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 84 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 85 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 87 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 88 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 89 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 90 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 91 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 92 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 93 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 94 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 95 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 96 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 98 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 99 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 100 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 101 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 102 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 103 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 104 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 105 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 106 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 107 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 108 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |

**Table 5-4**

**Summary of RAMP Water Field Duplicate Results for the Modified Green Bay Method in 2012**

| Method | Matrix | Analyte | Total Number Field Duplicate Pairs | Total Number Field Duplicate Pairs with NDs for Both Samples | Total Number Field Duplicate Pairs with Positives in Either Sample | | | | | Overall Percent Meet Criteria |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Total Number | Number Meet Criteria | Number Do Not Meet Criteria | Percent Meet Criteria | Percent Do Not Meet Criteria | |
| NE294_00 | Water | Peak 109 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 110 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 111 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 112 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 113 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 114 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 115 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 116 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 117 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | Peak 118 | 35 | 35 | 0 | 0 | 0 | NA | NA | 100 |
| NE294_00 | Water | All results[1] | 3990 | 2539 | 1451 | 1340 | 111 | 92 | 8 | 97 |

Notes:

1 . All results = total number field duplicate pairs multiplied by the number of analytes determined by the method.

ND = not detected

PCB = polychlorinated biphenyl

RAMP = Remedial Action Monitoring Program

**Table 5-5**
**Summary of RAMP Water Field Duplicate Results for Aroclor PCBs in 2012**

| Method | Analyte | Total Number Field Duplicate Pairs | Total Number Field Duplicate Pairs with NDs for Both Samples | Total Number Field Duplicate Pairs with Positives in Either Sample | | | | | Overall Percent Meet Criteria |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Total Number | Number Meet Criteria | Do Not Meet Criteria | Percent Meet Criteria | Percent Do Not Meet Criteria | |
| NE273_02 | Total PCB | 59 | 4 | 55 | 52 | 3 | 95 | 5 | 95 |
| NE273_02 | Aroclor 1016 | 59 | 59 | 0 | 0 | 0 | NA | NA | 100 |
| NE273_02 | Aroclor 1221 | 59 | 4 | 55 | 54 | 1 | 98 | 2 | 98 |
| NE273_02 | Aroclor 1232 | 59 | 59 | 0 | 0 | 0 | NA | NA | 100 |
| NE273_02 | Aroclor 1242 | 59 | 16 | 43 | 43 | 0 | 100 | 0 | 100 |
| NE273_02 | Aroclor 1248 | 59 | 59 | 0 | 0 | 0 | NA | NA | 100 |
| NE273_02 | Aroclor 1254 | 59 | 58 | 1 | 1 | 0 | 100 | 0 | 100 |
| NE273_02 | Aroclor 1260 | 59 | 59 | 0 | 0 | 0 | NA | NA | 100 |
| NE273_02 | All results | 472 | 318 | 154 | 150 | 4 | 97 | 3 | 99 |

Notes:

All results = total number field duplicate pairs multiplied by the number of analytes determined by the method.

ND = not detected

PCB = polychlorinated biphenyl

RAMP = Remedial Action Monitoring Program

**Table 5-6**

**Summary of Water Field Duplicate Results for all Non-PCB Methods in 2012**

| Method | Analyte | Total Number Field Duplicate Pairs | Total Number Field Duplicate Pairs with NDs for Both Samples | Total Number Field Duplicate Pairs with Positives in Either Sample | | | | | Overall Percent Meet Criteria |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Total Number | Number Meet Criteria | Do Not Meet Criteria | Percent Meet Criteria | Percent Do Not Meet Criteria | |
| SM 5310B | Total organic carbon | 3 | 0 | 3 | 3 | 0 | 100 | 0 | 100 |
| SM 2540D | Total suspended solids | 96 | 3 | 93 | 52 | 41 | 56 | 44 | 57 |

Notes:

All results = total number field duplicate pairs multiplied by the number of analytes determined by the method.

ND = not detected

PCB = polychlorinated biphenyl

**Table 5-7**

**Summary of RAMP Downstream Deposition Study Sediment Field Duplicate Results for Aroclor PCBs in 2012**

| Method | Analyte | Total Number Field Duplicate Pairs | Total Number Field Duplicate Pairs with NDs for Both Samples | Total Number Field Duplicate Pairs with Positives in Either Sample | | | | | Overall Percent Meet Criteria |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Total Number | Number Meet Criteria | Do Not Meet Criteria | Percent Meet Criteria | Percent Do Not Meet Criteria | |
| GEHR8082 | Total PCB | 9 | 0 | 9 | 8 | 1 | 89 | 11 | 89 |
| GEHR8082 | Aroclor 1016 | 9 | 9 | 0 | 0 | 0 | NA | NA | 100 |
| GEHR8082 | Aroclor 1221 | 9 | 0 | 9 | 8 | 1 | 89 | 11 | 89 |
| GEHR8082 | Aroclor 1232 | 9 | 9 | 0 | 0 | 0 | NA | NA | 100 |
| GEHR8082 | Aroclor 1242 | 9 | 0 | 9 | 7 | 2 | 78 | 22 | 78 |
| GEHR8082 | Aroclor 1248 | 9 | 9 | 0 | 0 | 0 | NA | NA | 100 |
| GEHR8082 | Aroclor 1254 | 9 | 8 | 1 | 1 | 0 | 100 | 0 | 100 |
| GEHR8082 | Aroclor 1260 | 9 | 9 | 0 | 0 | 0 | NA | NA | 100 |
| GEHR8082 | All results | 72 | 44 | 28 | 24 | 4 | 86 | 14 | 94 |

Notes:

All results = total number field duplicate pairs multiplied by the number of analytes determined by the method.

ND = not detected

PCB = polychlorinated biphenyl

RAMP = Remedial Action Monitoring Program

**Table 5-8**

**Summary of Downstream Deposition Study Sediment Field Duplicate Results for all Non-PCB Methods in 2012**

| Method | Analyte | Total Number Field Duplicate Pairs | Total Number Field Duplicate Pairs with NDs for Both Samples | Total Number Field Duplicate Pairs with Positives in Either Sample | | | | | Overall Percent Meet Criteria |
|---|---|---|---|---|---|---|---|---|---|
| | | | | Total Number | Number Meet Criteria | Do Not Meet Criteria | Percent Meet Criteria | Percent Do Not Meet Criteria | |
| SM 5310B | Total organic carbon | 9 | 0 | 9 | 3 | 6 | 33 | 67 | 33 |
| ASTM D2216-98 | Moisture content | 9 | 0 | 9 | 7 | 2 | 78 | 22 | 78 |

Notes:

All results = total number field duplicate pairs multiplied by the number of analytes determined by the method.

ND = not detected

PCB = polychlorinated biphenyl

**Table 5-9**

**Summary Statistics of 2012 RAMP Equipment Blanks for Water Sampling Program**

| Analyte | Matrix | Method | Number Field Blanks | Field Blanks with Results > MDL | Minimum Concentration | Maximum Concentration | Average Concentration | Median Concentration | Concentration Units | Percent Contaminated |
|---|---|---|---|---|---|---|---|---|---|---|
| Dissolved lead | Filtered water | EPA 200.8 SL | 4 | 4 | 0.12 | 0.20 | 0.15 | 0.14 | µg/L | 100% |
| mGBM Peak 2 | Whole water | NE294_00 | 5 | 1 | 0.0677 | 0.0677 | 0.0677 | 0.0677 | ng/L | 20% |
| mGBM Peak 5-4 | Whole water | NE294_00 | 5 | 2 | 0.0682 | 0.224 | 0.146 | 0.146 | ng/L | 40% |
| mGBM Peak 5-1 | Whole water | NE294_00 | 5 | 2 | 0.00878 | 0.0136 | 0.0112 | 0.0112 | ng/L | 40% |
| mGBM Peak 6 | Whole water | NE294_00 | 5 | 4 | 0.00570 | 0.0115 | 0.00890 | 0.00921 | ng/L | 80% |
| mGBM Peak 7 | Whole water | NE294_00 | 5 | 4 | 0.0131 | 0.0562 | 0.0395 | 0.0444 | ng/L | 80% |
| mGBM Peak 10 | Whole water | NE294_00 | 5 | 5 | 0.0151 | 0.0429 | 0.0271 | 0.0245 | ng/L | 100% |
| mGBM Peak 14 | Whole water | NE294_00 | 5 | 1 | 0.0185 | 0.0185 | 0.0185 | 0.0185 | ng/L | 20% |
| mGBM Peak 15 | Whole water | NE294_00 | 5 | 3 | 0.0203 | 0.0436 | 0.0313 | 0.0299 | ng/L | 60% |
| mGBM Peak 16 | Whole water | NE294_00 | 5 | 5 | 0.00246 | 0.0182 | 0.00941 | 0.00701 | ng/L | 100% |
| mGBM Peak 17 | Whole water | NE294_00 | 5 | 3 | 0.0195 | 0.0387 | 0.0312 | 0.0353 | ng/L | 60% |
| mGBM Peak 21 | Whole water | NE294_00 | 5 | 5 | 0.00233 | 0.0183 | 0.00976 | 0.00629 | ng/L | 100% |
| mGBM Peak 22 | Whole water | NE294_00 | 5 | 5 | 0.0103 | 0.0446 | 0.0253 | 0.0281 | ng/L | 100% |
| mGBM Peak 25 | Whole water | NE294_00 | 5 | 1 | 0.0182 | 0.0182 | 0.0182 | 0.0182 | ng/L | 20% |
| mGBM Peak 26 | Whole water | NE294_00 | 5 | 1 | 0.0152 | 0.0152 | 0.0152 | 0.0152 | ng/L | 20% |
| mGBM Peak 27 | Whole water | NE294_00 | 5 | 3 | 0.00601 | 0.0337 | 0.0206 | 0.0222 | ng/L | 60% |
| mGBM Peak 29 | Whole water | NE294_00 | 5 | 4 | 0.00970 | 0.0257 | 0.0174 | 0.0170 | ng/L | 80% |
| mGBM Peak 32 | Whole water | NE294_00 | 5 | 1 | 0.0205 | 0.0205 | 0.0205 | 0.0205 | ng/L | 20% |
| mGBM Peak 33 | Whole water | NE294_00 | 5 | 1 | 0.0404 | 0.0404 | 0.0404 | 0.0404 | ng/L | 20% |
| mGBM Peak 34 | Whole water | NE294_00 | 5 | 3 | 0.00602 | 0.0129 | 0.00932 | 0.00903 | ng/L | 60% |
| mGBM Peak 37 | Whole water | NE294_00 | 5 | 2 | 0.0264 | 0.0416 | 0.0340 | 0.0340 | ng/L | 40% |
| mGBM Peak 42 | Whole water | NE294_00 | 5 | 3 | 0.00598 | 0.0154 | 0.0114 | 0.0129 | ng/L | 60% |
| mGBM Peak 44 | Whole water | NE294_00 | 5 | 2 | 0.00543 | 0.00616 | 0.00580 | 0.00580 | ng/L | 40% |
| mGBM Peak 45 | Whole water | NE294_00 | 5 | 2 | 0.00382 | 0.0135 | 0.00866 | 0.00866 | ng/L | 40% |
| mGBM Peak 49 | Whole water | NE294_00 | 5 | 4 | 0.00751 | 0.0196 | 0.0145 | 0.0155 | ng/L | 80% |
| mGBM Peak 50 | Whole water | NE294_00 | 5 | 2 | 0.0157 | 0.0195 | 0.0176 | 0.0176 | ng/L | 40% |
| mGBM Peak 51 | Whole water | NE294_00 | 5 | 3 | 0.0127 | 0.0367 | 0.0227 | 0.0187 | ng/L | 60% |

**Table 5-9**

**Summary Statistics of 2012 RAMP Equipment Blanks for Water Sampling Program**

| Analyte | Matrix | Method | Number Field Blanks | Field Blanks with Results > MDL | Minimum Concentration | Maximum Concentration | Average Concentration | Median Concentration | Concentration Units | Percent Contaminated |
|---|---|---|---|---|---|---|---|---|---|---|
| mGBM Peak 52 | Whole water | NE294_00 | 5 | 2 | 0.00281 | 0.00944 | 0.00613 | 0.00613 | ng/L | 40% |
| mGBM Peak 54 | Whole water | NE294_00 | 5 | 3 | 0.00472 | 0.00520 | 0.00500 | 0.00508 | ng/L | 60% |
| mGBM Peak 55 | Whole water | NE294_00 | 5 | 4 | 0.00285 | 0.00340 | 0.00318 | 0.00324 | ng/L | 80% |
| mGBM Peak 56 | Whole water | NE294_00 | 5 | 3 | 0.0101 | 0.0192 | 0.0149 | 0.0153 | ng/L | 60% |
| mGBM Peak 57 | Whole water | NE294_00 | 5 | 4 | 0.0128 | 0.0288 | 0.0206 | 0.0203 | ng/L | 80% |
| mGBM Peak 59 | Whole water | NE294_00 | 5 | 1 | 0.00472 | 0.00472 | 0.00472 | 0.00472 | ng/L | 20% |
| mGBM Peak 63 | Whole water | NE294_00 | 5 | 3 | 0.00485 | 0.00780 | 0.00630 | 0.00626 | ng/L | 60% |
| mGBM Peak 64 | Whole water | NE294_00 | 5 | 1 | 0.0118 | 0.0118 | 0.0118 | 0.0118 | ng/L | 20% |
| mGBM Peak 65 | Whole water | NE294_00 | 5 | 3 | 0.00310 | 0.00343 | 0.00323 | 0.00317 | ng/L | 60% |
| mGBM Peak 66 | Whole water | NE294_00 | 5 | 3 | 0.00724 | 0.0119 | 0.00988 | 0.0105 | ng/L | 60% |
| mGBM Peak 67 | Whole water | NE294_00 | 5 | 3 | 0.00631 | 0.00647 | 0.00636 | 0.00631 | ng/L | 60% |
| mGBM Peak 68 | Whole water | NE294_00 | 5 | 2 | 0.0216 | 0.0219 | 0.0218 | 0.0218 | ng/L | 40% |

Notes:

µg/L = micrograms per liter

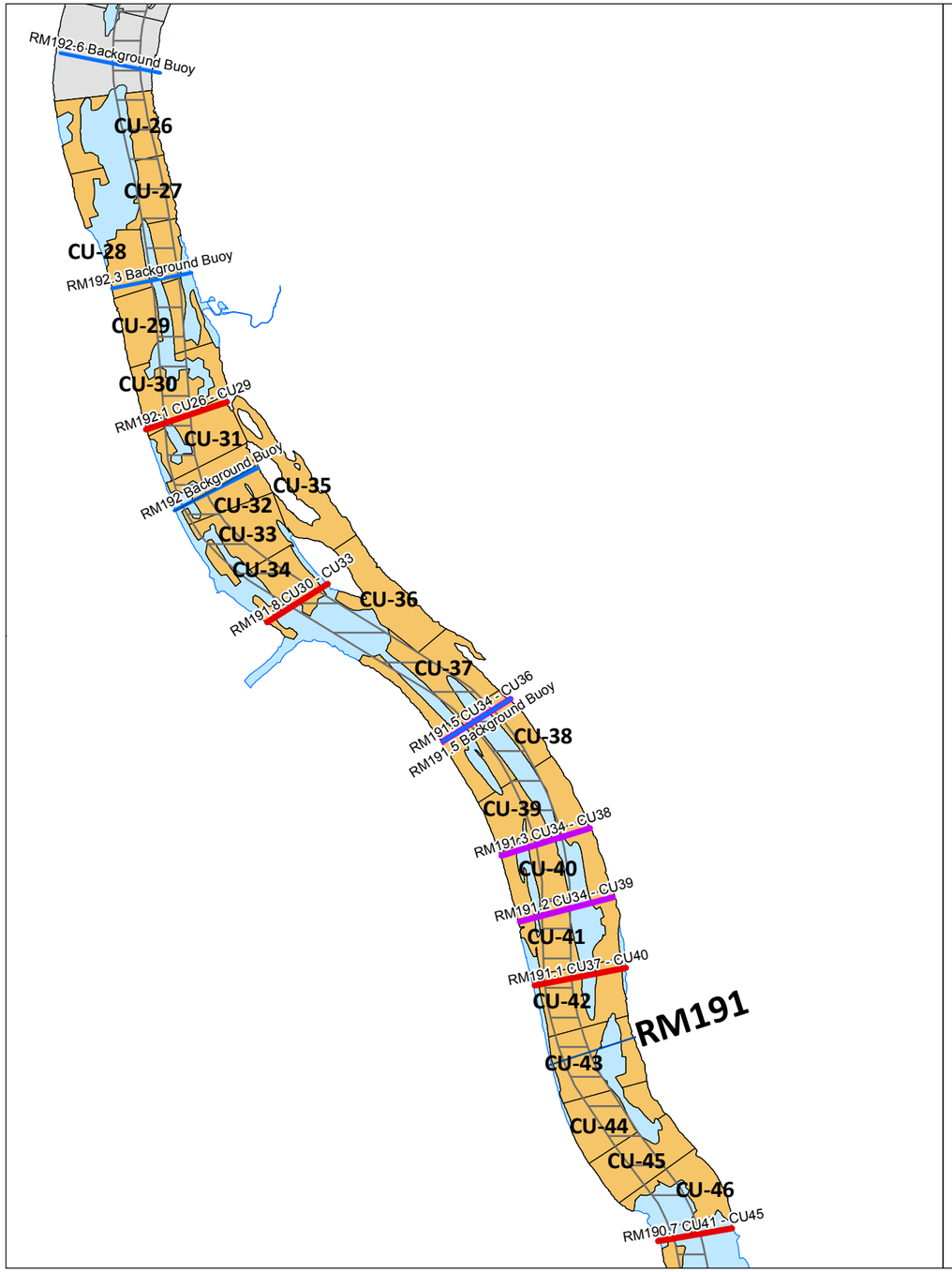
ng/L = nanograms per liter

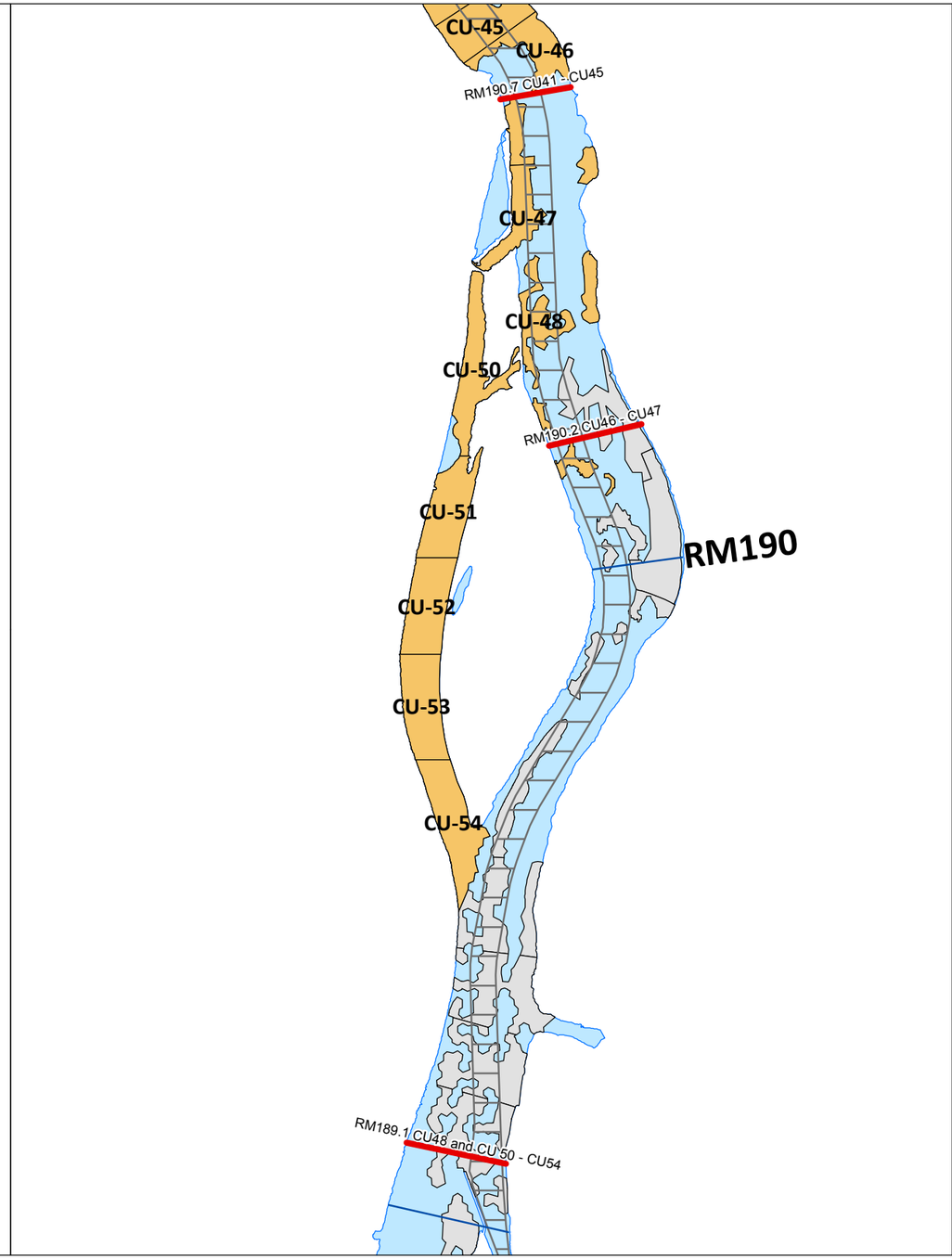
MDL = method detection limit

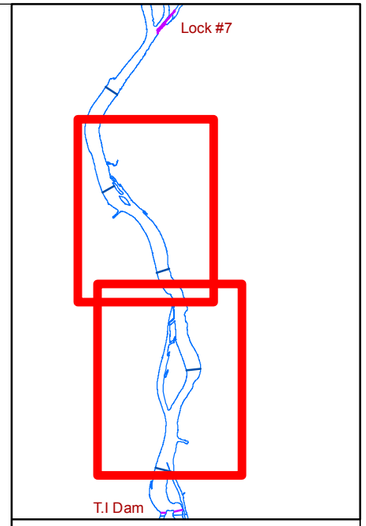
mGBM = Modified Green Bay Method

RAMP = Remedial Action Monitoring Program

# FIGURES




**Notes:**
Buoy Transects consisted of one monitoring buoy.
Near-field Transects consisted of four monitoring buoys.
Transects labeld with river mile and CUs being monitored.

LEGEND

**Monitoring Role**

- Background
- 1st Near-field
- 2nd Near-field
- Navigation Channel
- Dredging Areas (2012)
- Certification Units
- Dams and Locks
- Hudson River
- River Miles

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ANCHOR QEA

0 1 2 4 Miles

**Figure 2-1**
Near-field Dredge Monitoring Operations Overview
2012 Water and Fish Data Summary Report
General Electric Company

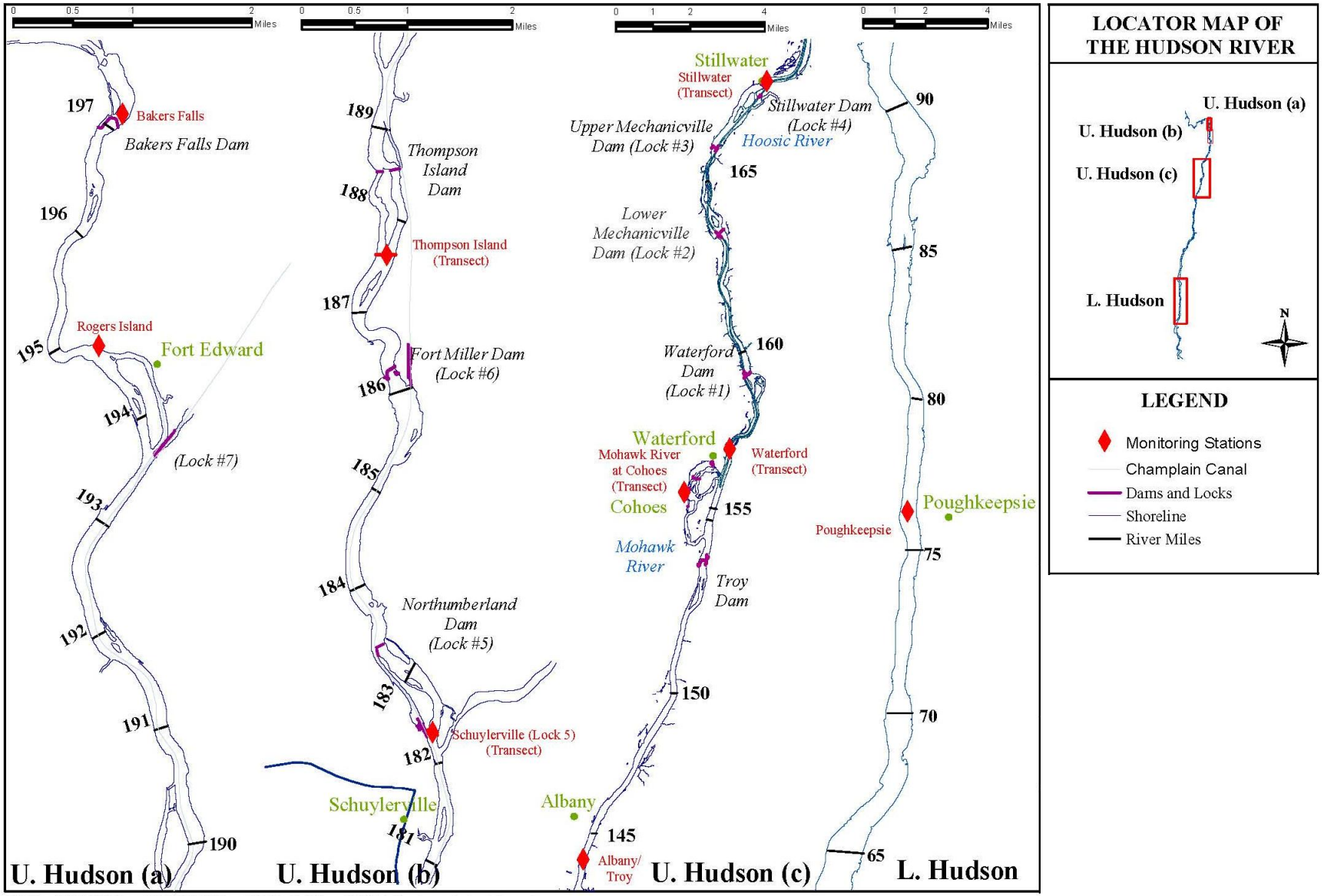


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**Figure 2-2**
Far-field Water Monitoring Stations
2012 Water and Fish Data Summary Report
General Electric Company

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**Figure 2-3**
Variable Speed Bridge and Boat Cranes Used for the Far-field Water Monitoring Program
2012 Water and Fish Data Summary Report
General Electric Company


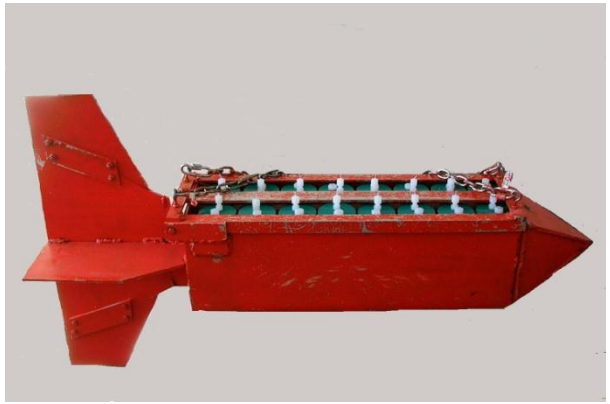



**Figure 2-4**
Multiple Aliquot Depth Integrated Sampler (MADIS)
2012 Water and Fish Data Summary Report
General Electric Company

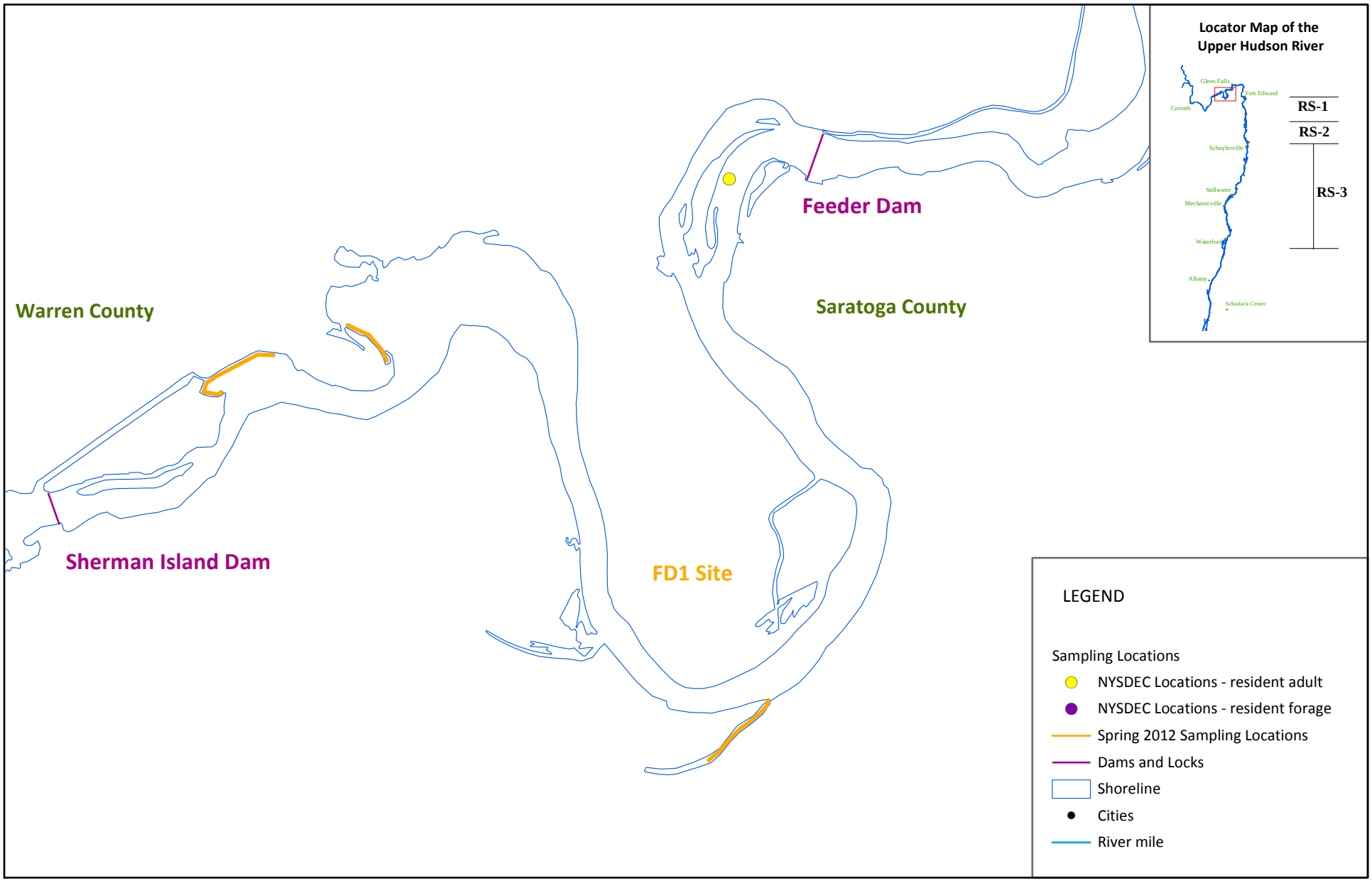


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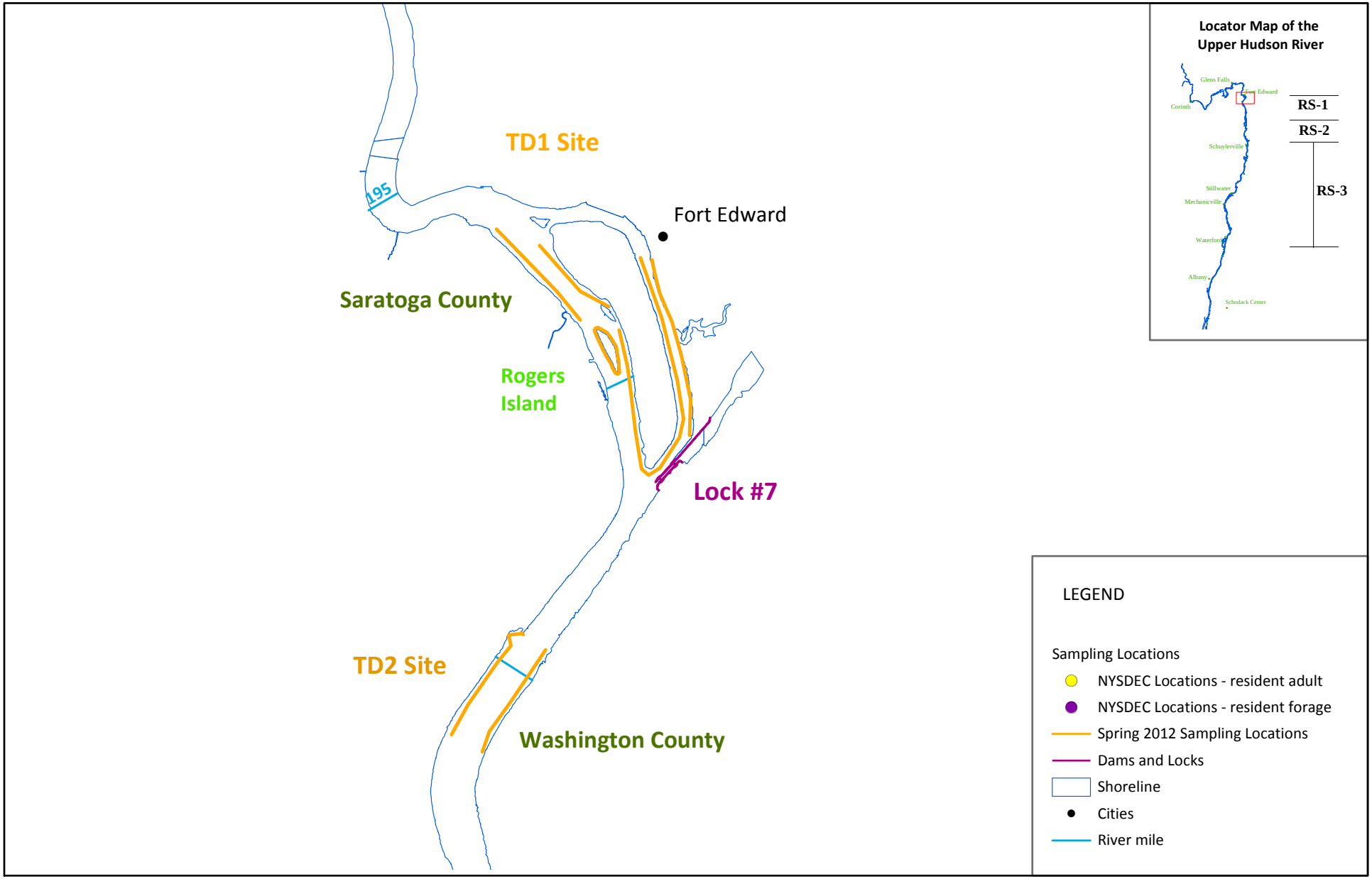
**Figure 2-5a**
Spring 2012 Fish Sampling Locations
2012 Water and Fish Data Summary Report
General Electric Company

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ANCHOR QEA

0 0.5 1 Miles

**Figure 2-5b**
Spring 2012 Fish Sampling Locations
2012 Water and Fish Data Summary Report
General Electric Company

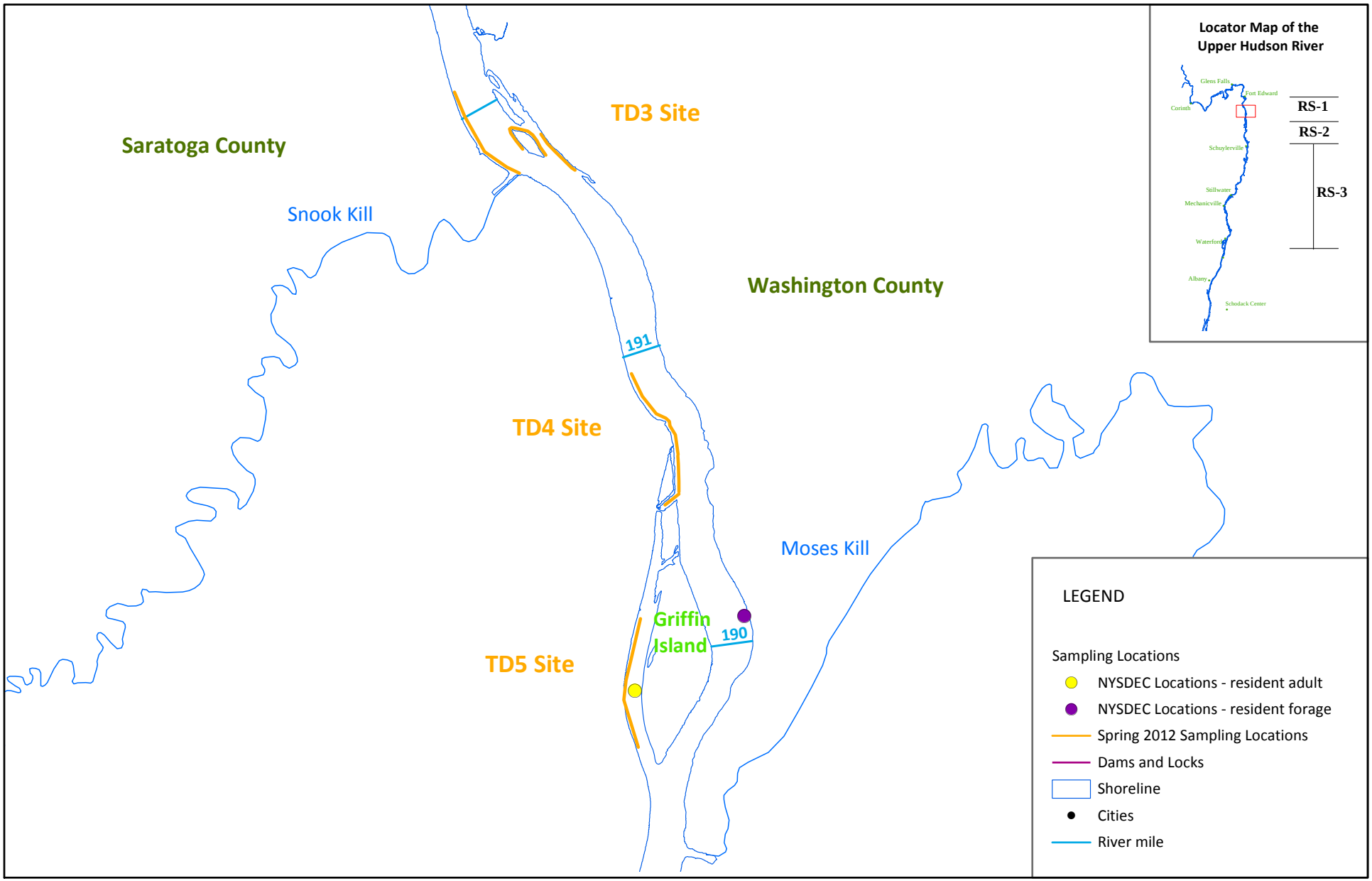


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**Figure 2-5c**
Spring 2012 Fish Sampling Locations
2012 Water and Fish Data Summary Report
General Electric Company

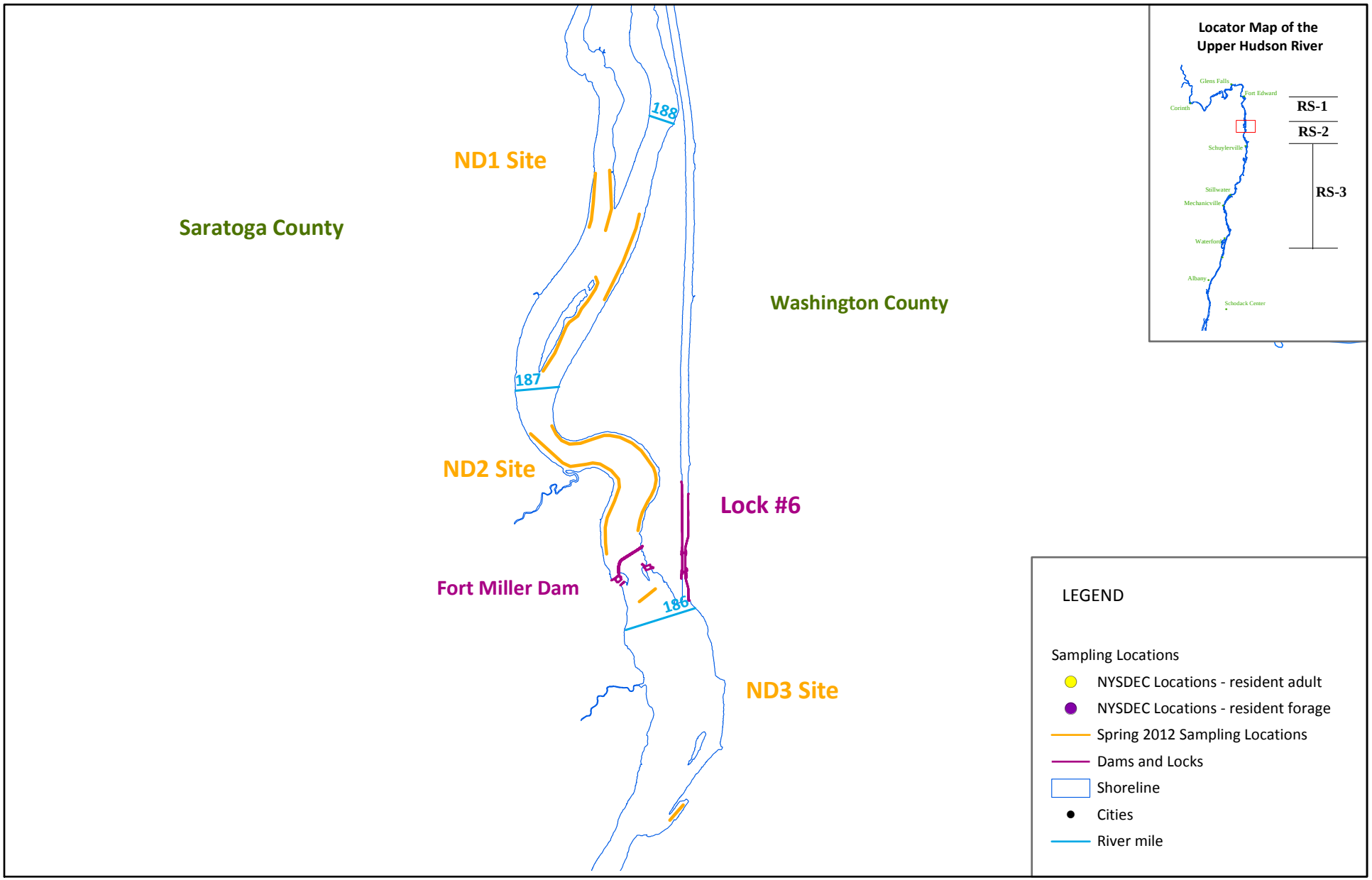


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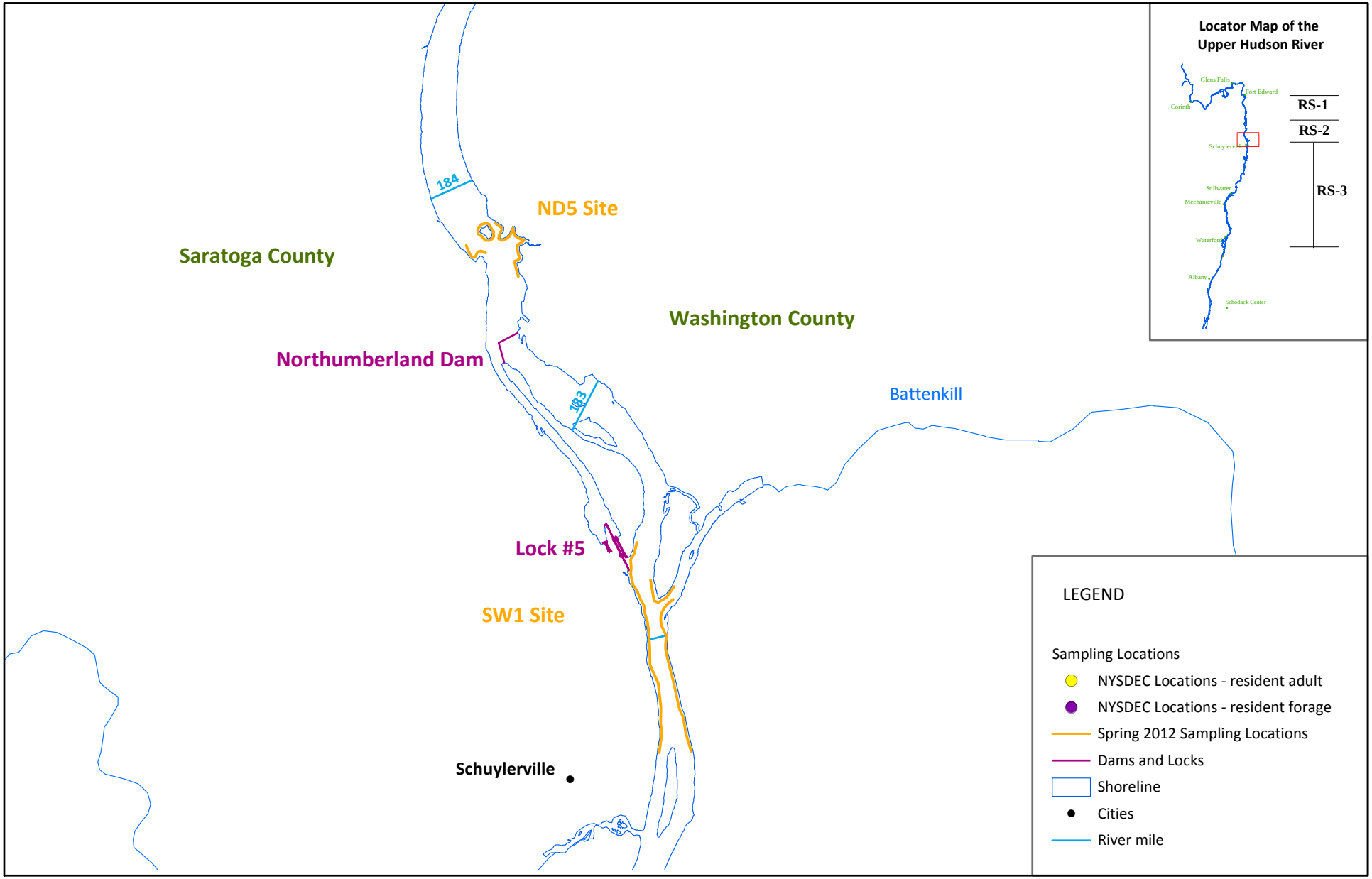
**Figure 2-5d**
Spring 2012 Fish Sampling Locations
2012 Water and Fish Data Summary Report
General Electric Company

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ANCHOR QEA

0 0.5 1 Miles

**Figure 2-5e**
Spring 2012 Fish Sampling Locations
2012 Water and Fish Data Summary Report
General Electric Company

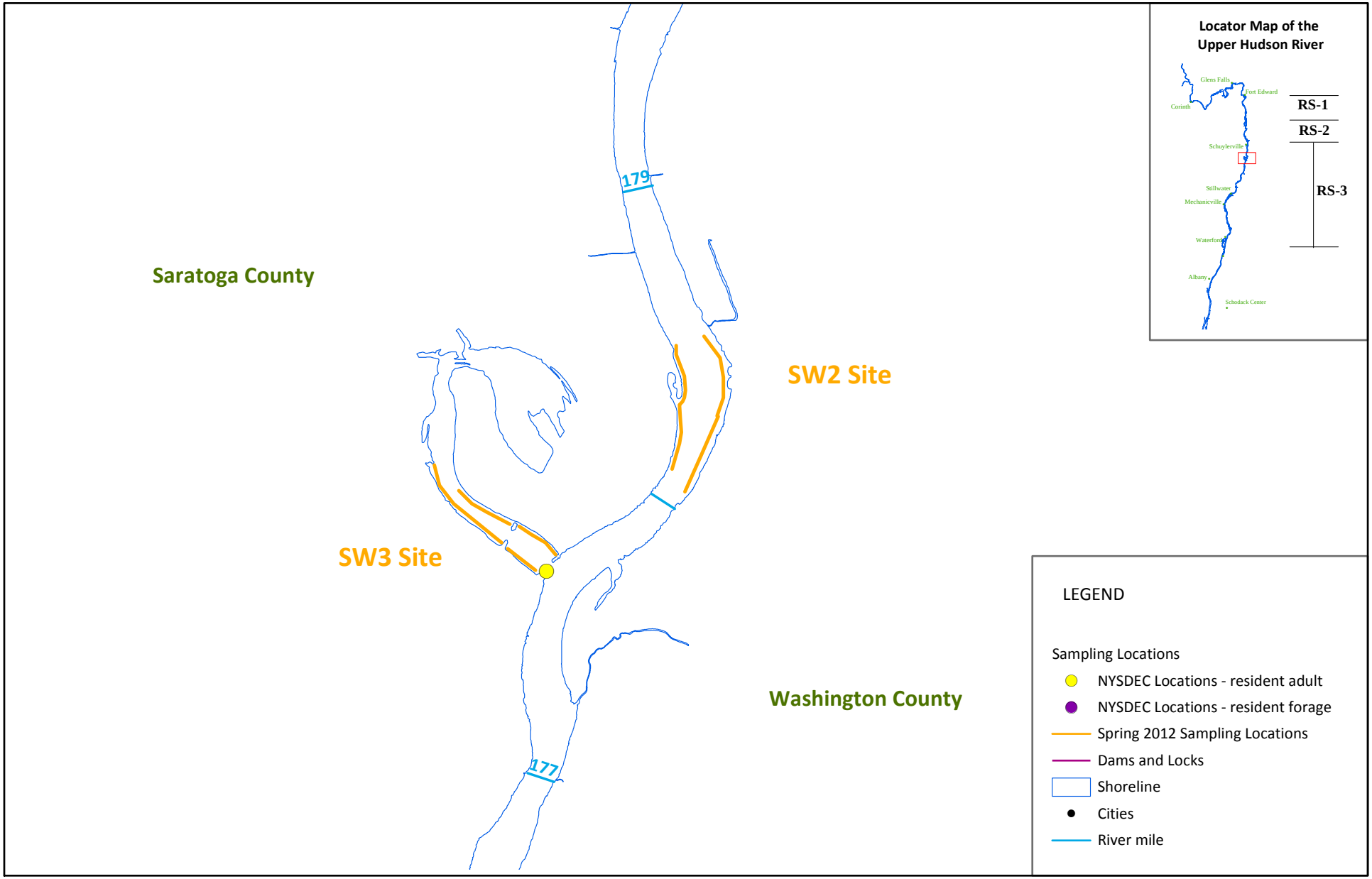


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**Figure 2-5f**
Spring 2012 Fish Sampling Locations
2012 Water and Fish Data Summary Report
General Electric Company

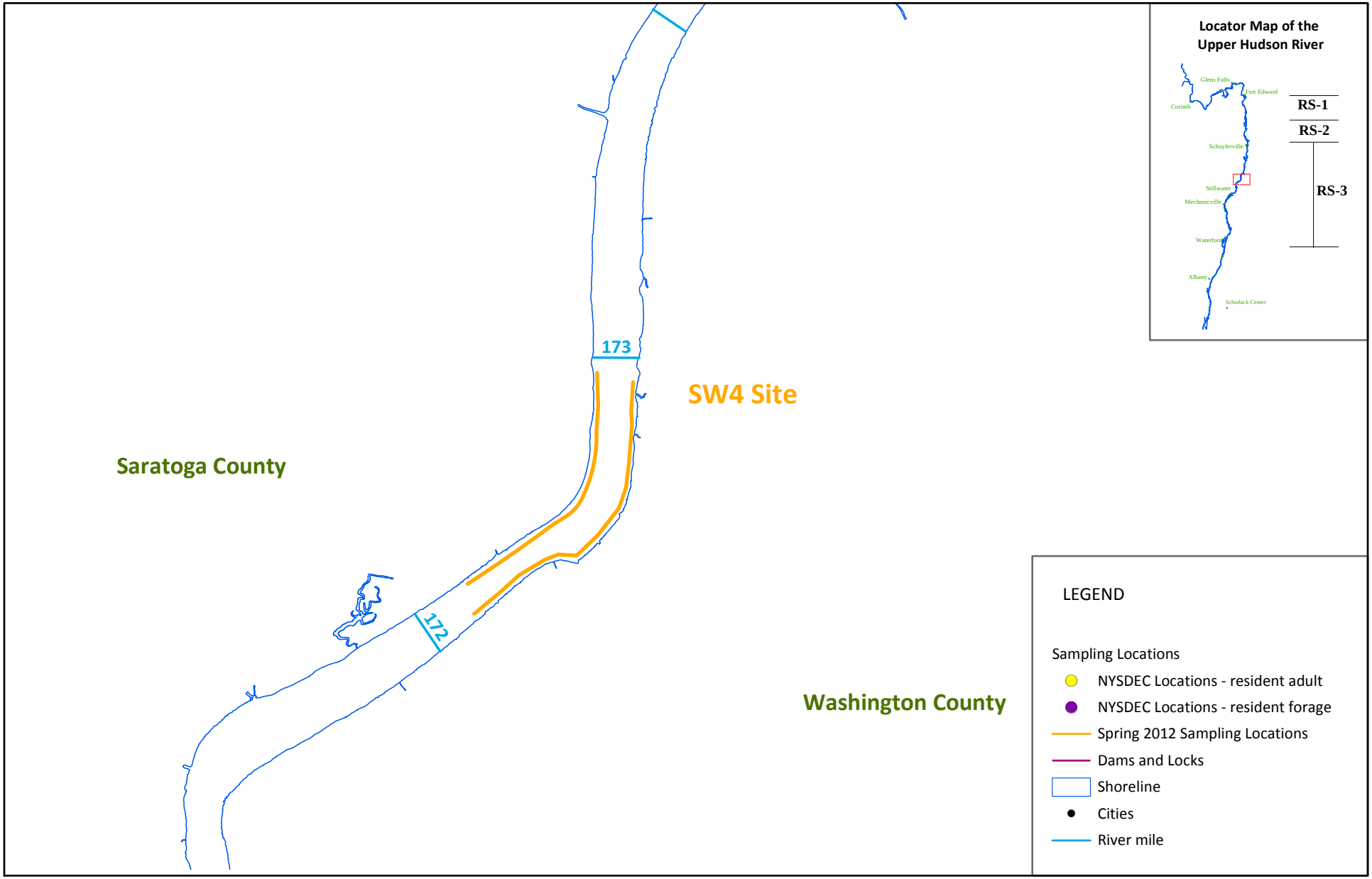


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**Figure 2-5g**
Spring 2012 Fish Sampling Locations
2012 Water and Fish Data Summary Report
General Electric Company

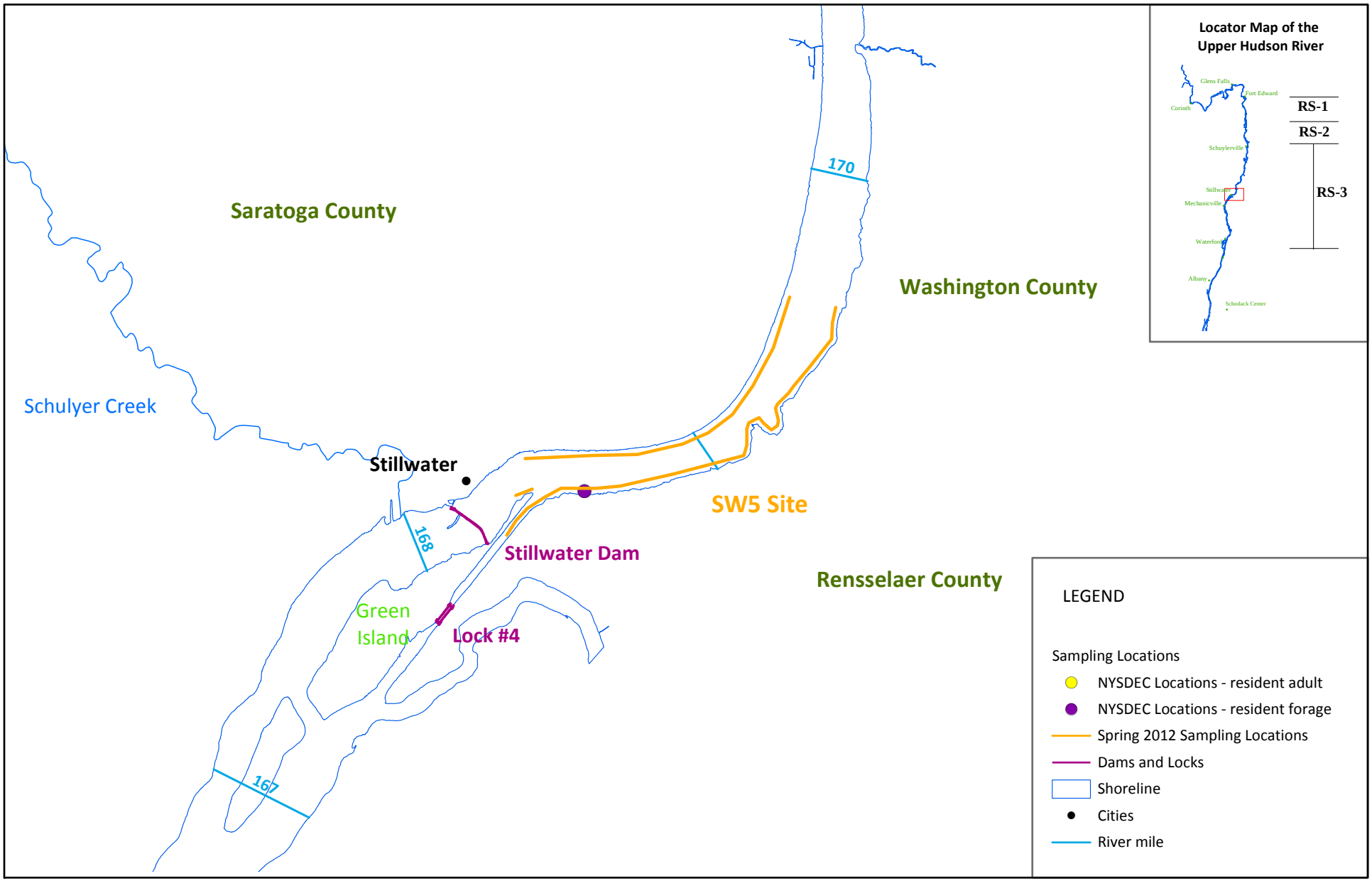


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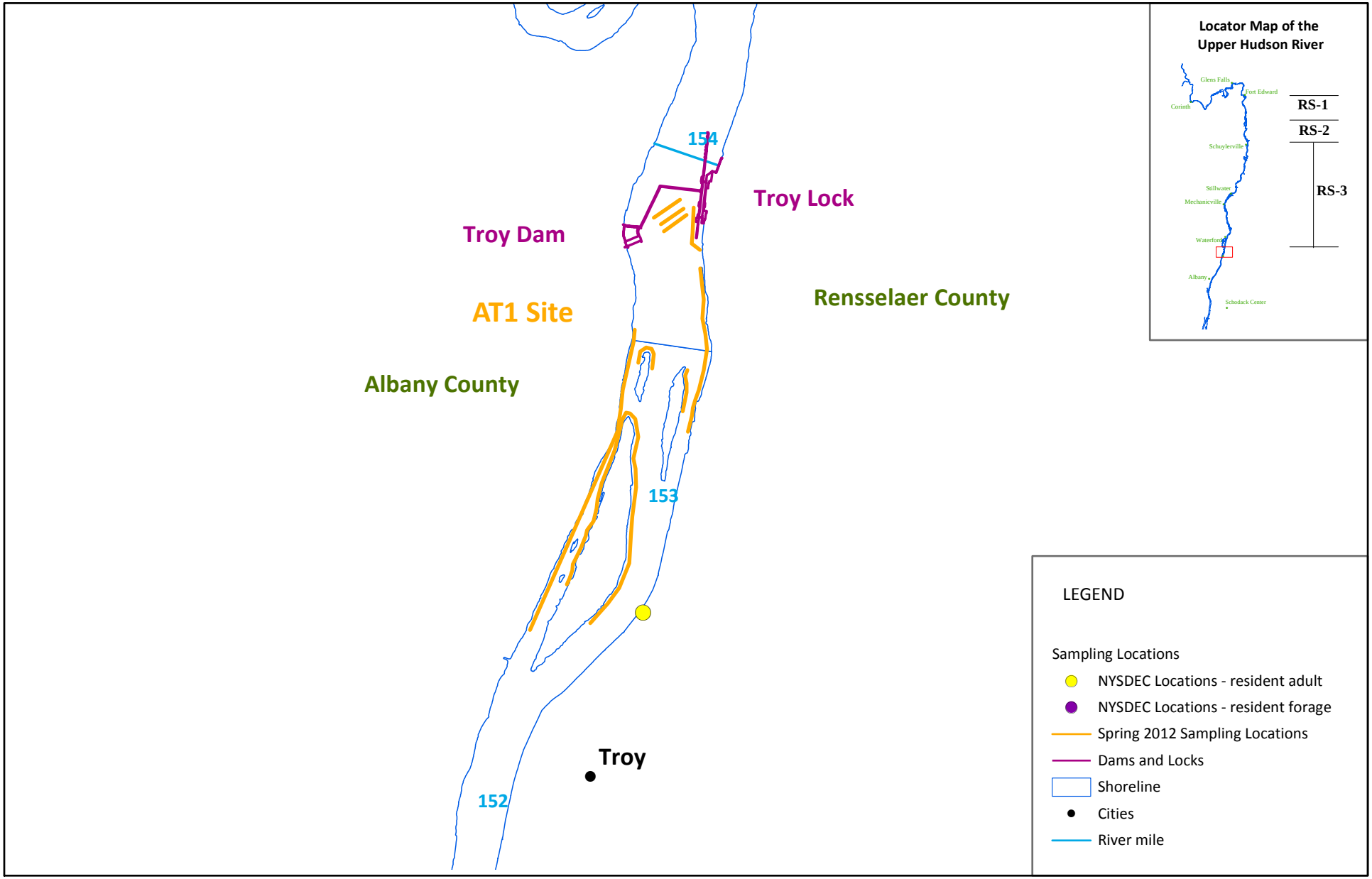
**Figure 2-5h**
Spring 2012 Fish Sampling Locations
2012 Water and Fish Data Summary Report
General Electric Company

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ANCHOR QEA

0 0.5 1 Miles

**Figure 2-5i**
Spring 2012 Fish Sampling Locations
2012 Water and Fish Data Summary Report
General Electric Company

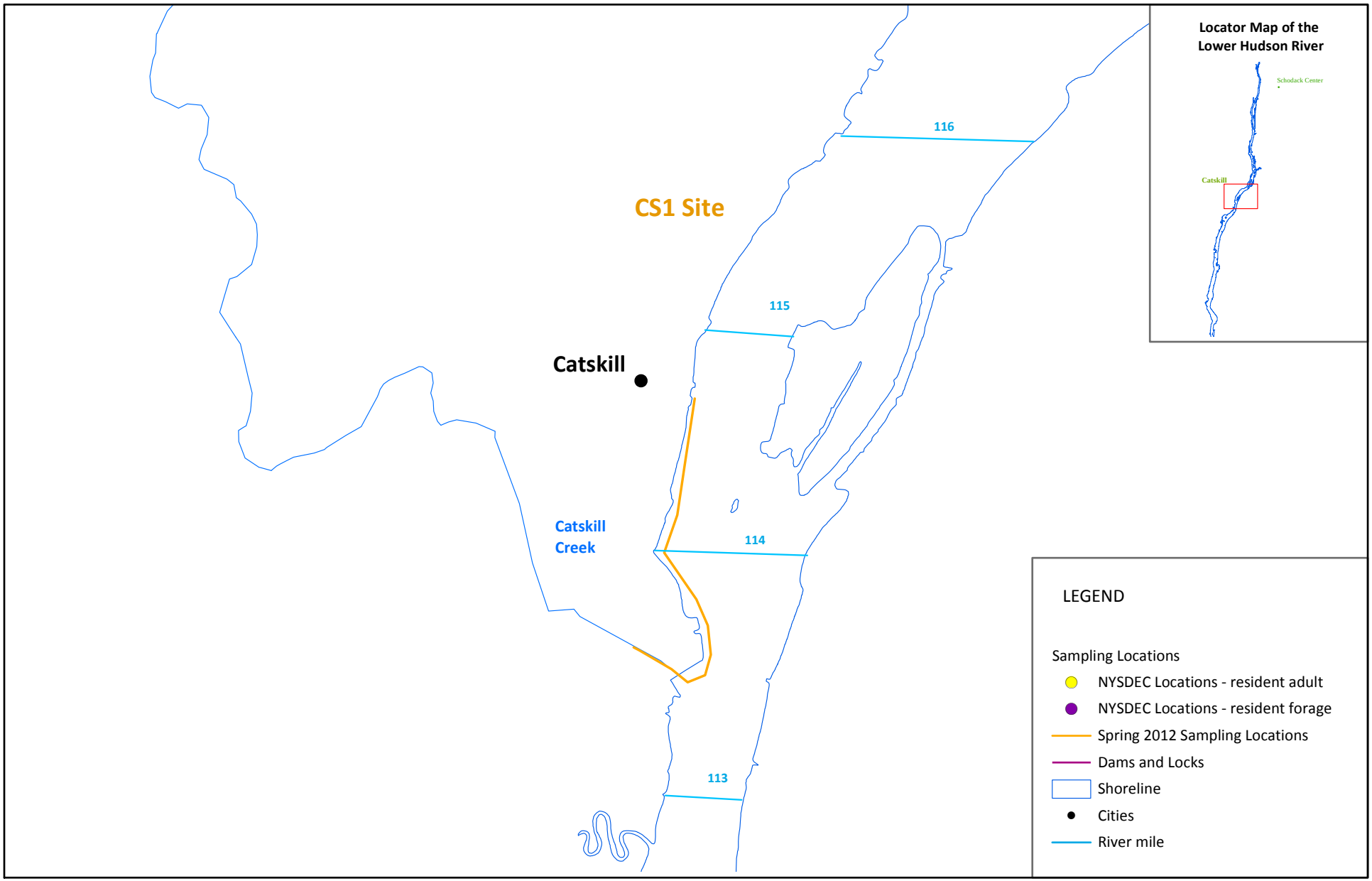


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**Figure 2-5j**
Spring 2012 Fish Sampling Locations
2012 Water and Fish Data Summary Report
General Electric Company

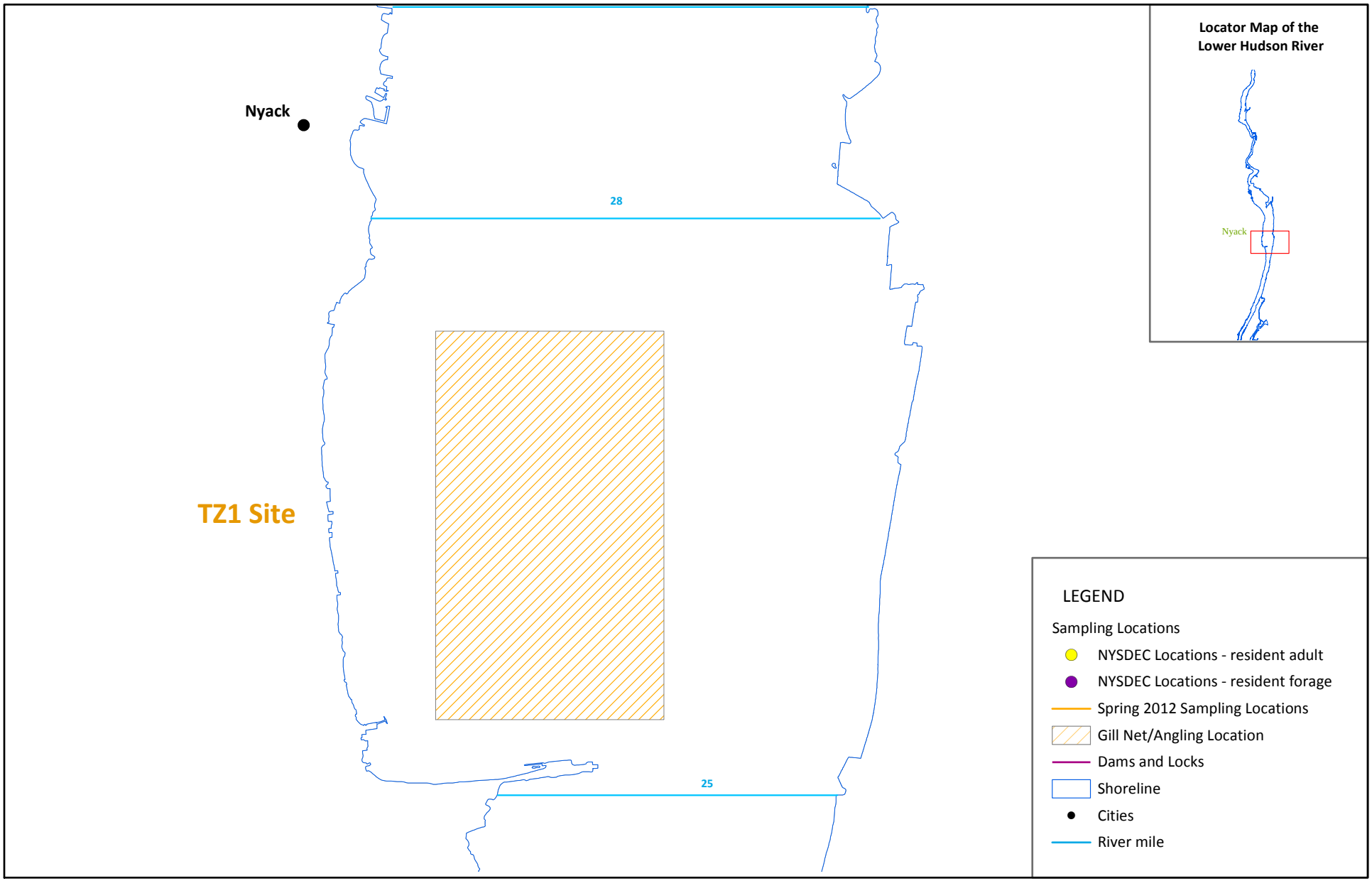


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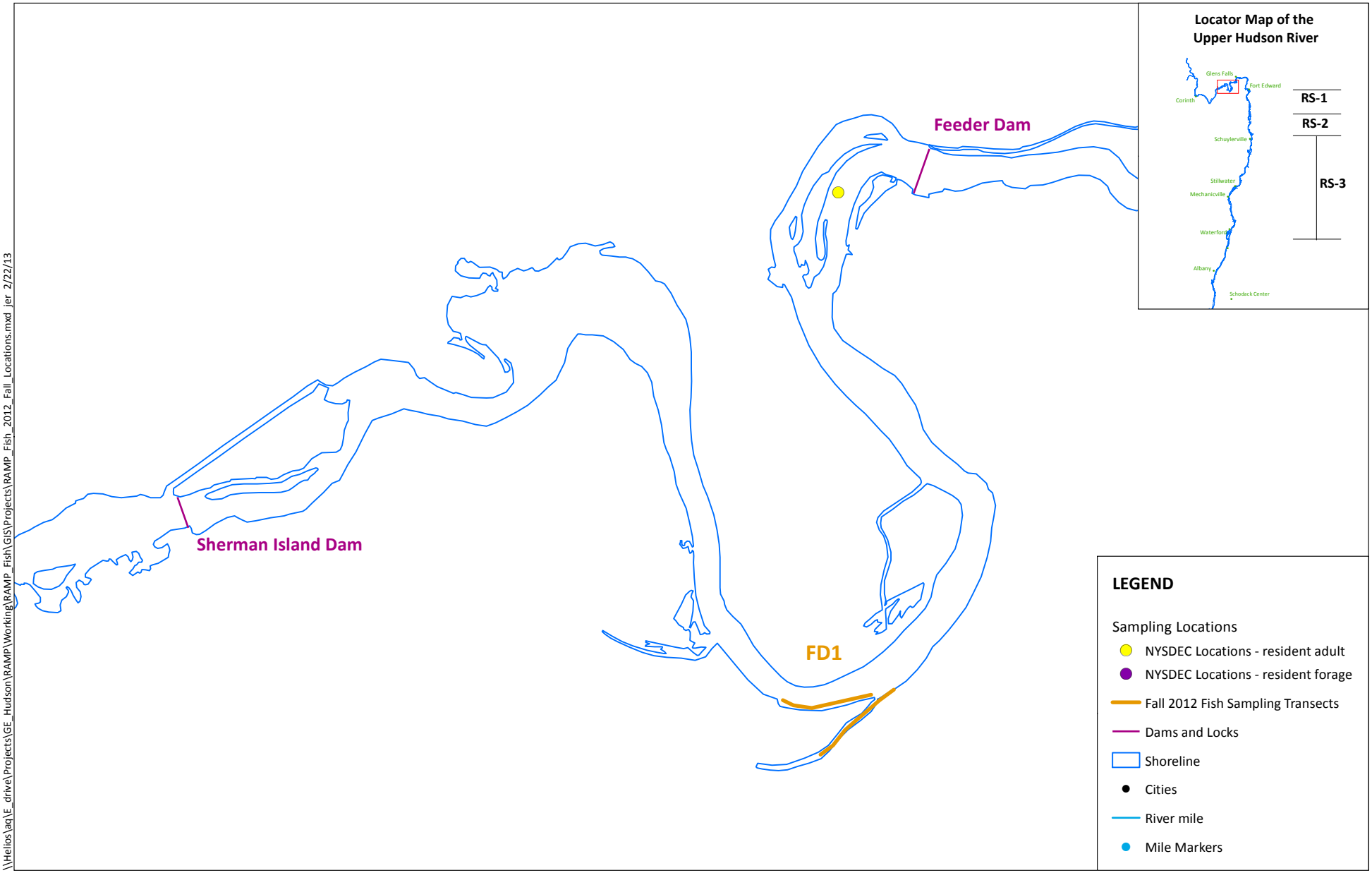
**Figure 2-5k**
Spring 2012 Fish Sampling Locations
2012 Water and Fish Data Summary Report
General Electric Company




ANCHOR QEA

Miles
0 0.5 1

**Figure 2-6a**
Fall 2012 Fish Sampling Locations
2012 Water and Fish Data Summary Report
General Electric Company

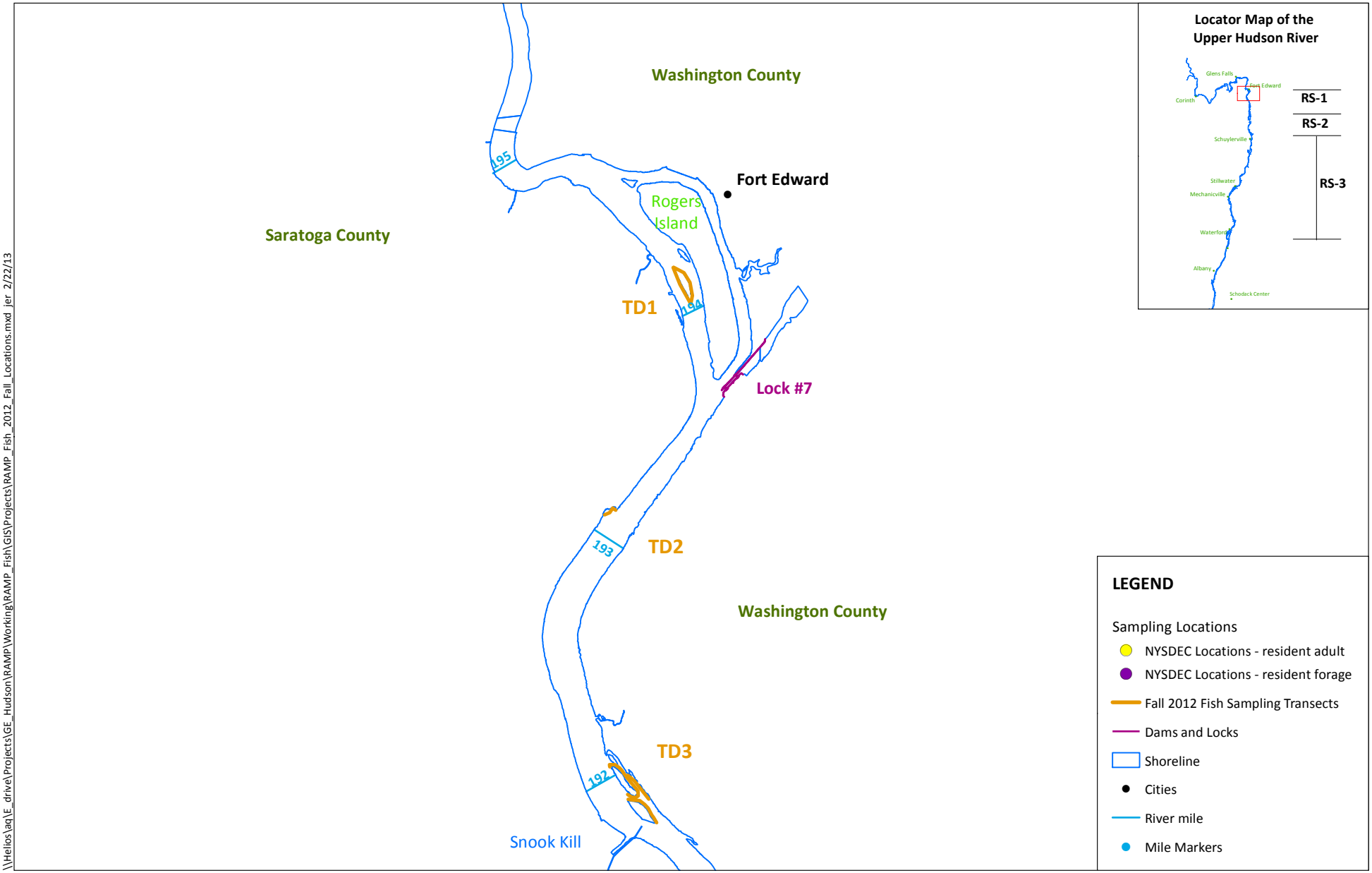



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**Figure 2-6b**
Fall 2012 Fish Sampling Locations
2012 Water and Fish Data Summary Report
General Electric Company

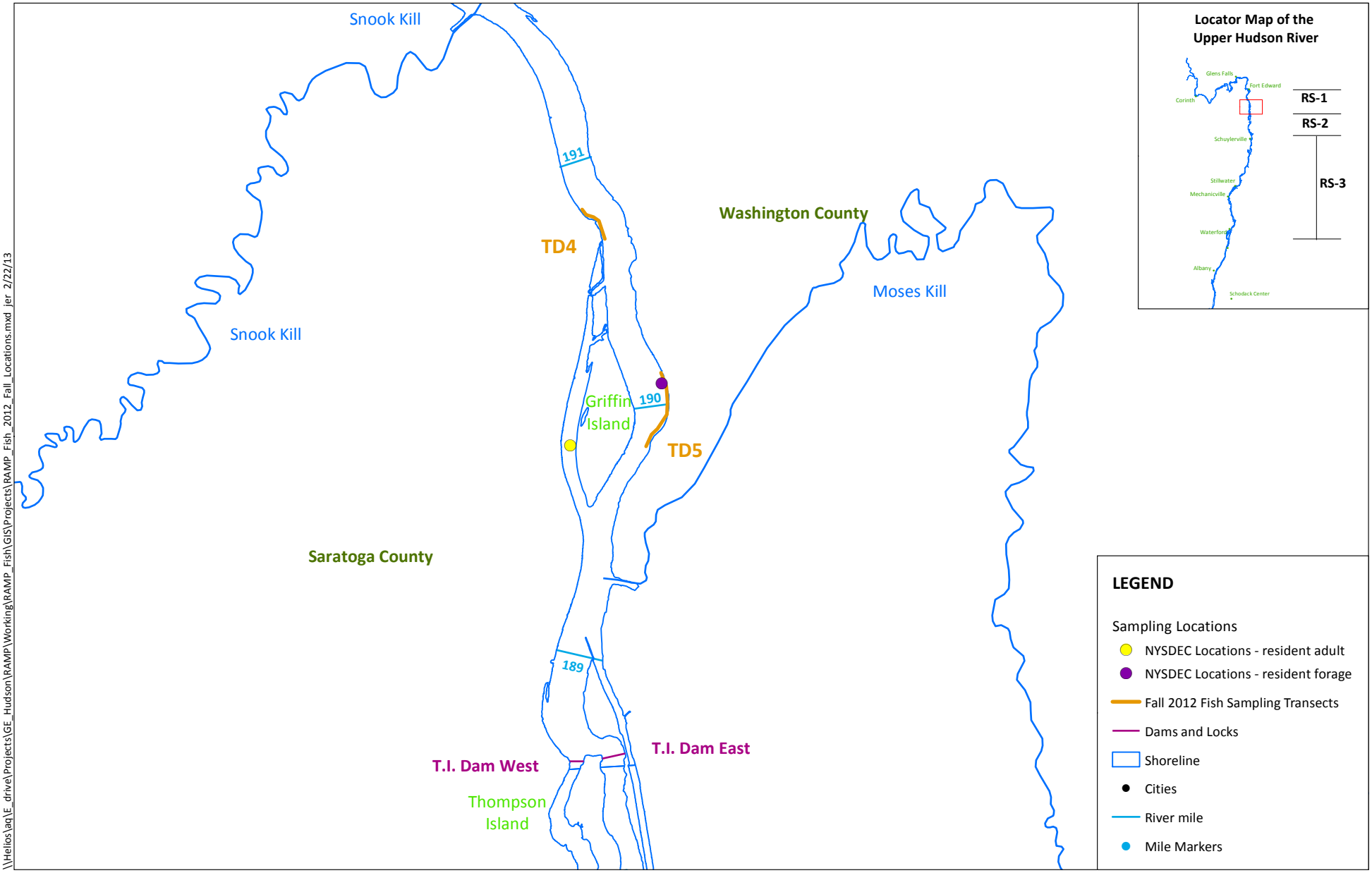


**Figure 2-6c**
Fall 2012 Fish Sampling Locations
2012 Water and Fish Data Summary Report
General Electric Company

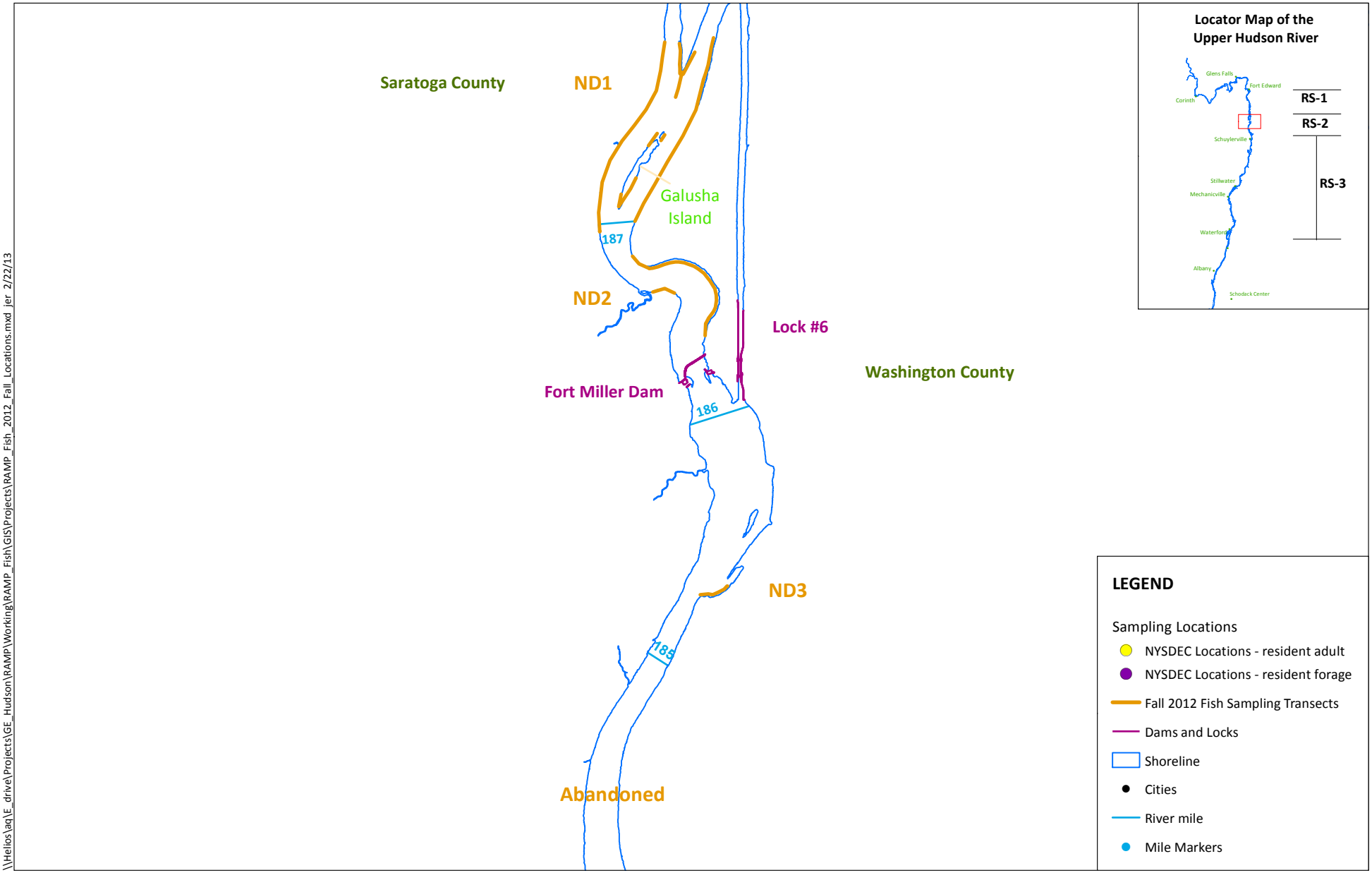


**Figure 2-6d**
Fall 2012 Fish Sampling Locations
2012 Water and Fish Data Summary Report
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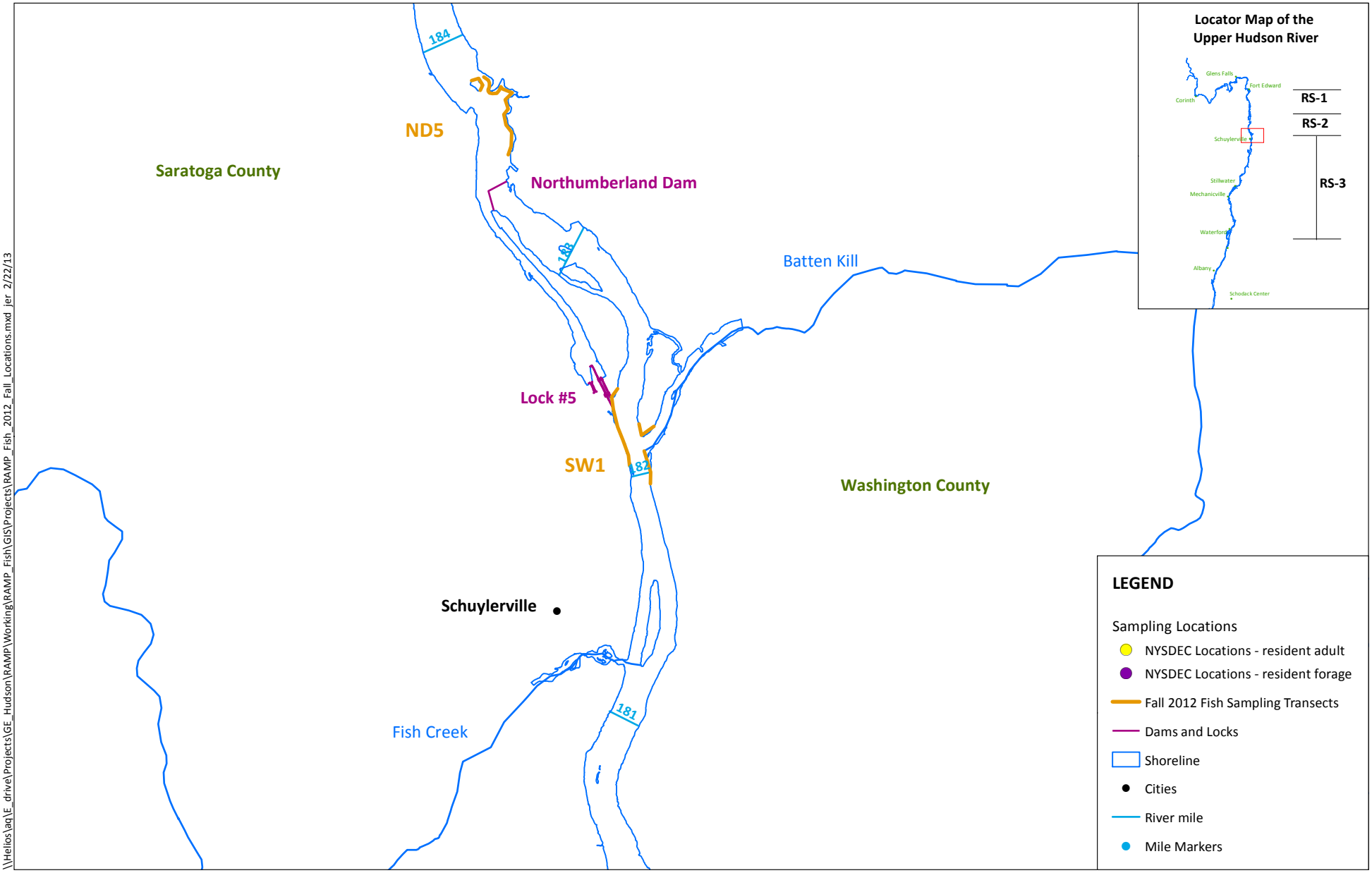


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ANCHOR QEA

Miles
0 0.5 1

**Figure 2-6e**
Fall 2012 Fish Sampling Locations
2012 Water and Fish Data Summary Report
General Electric Company

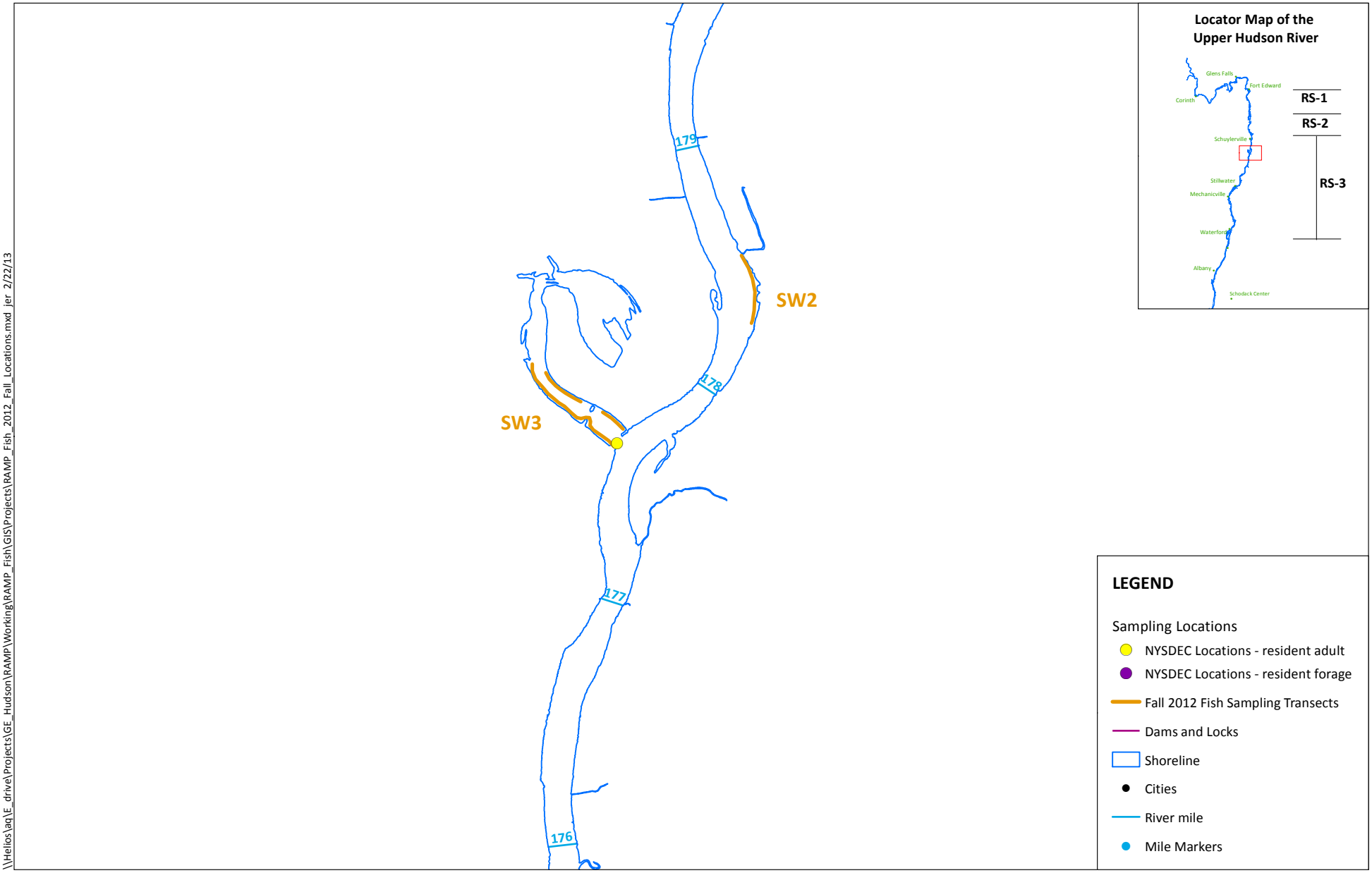


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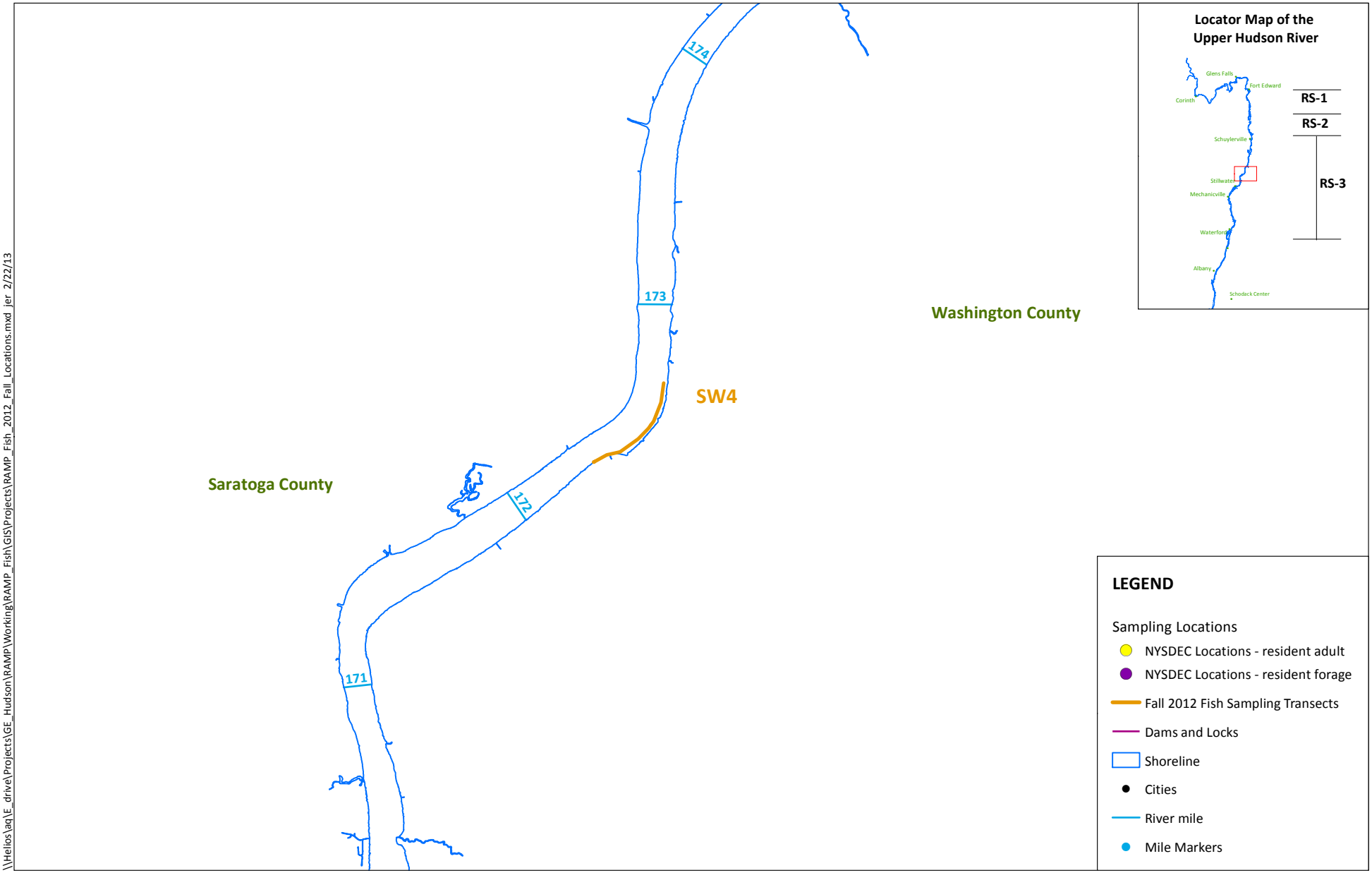
**Figure 2-6f**
Fall 2012 Fish Sampling Locations
2012 Water and Fish Data Summary Report
General Electric Company

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ANCHOR QEA

Miles
0 0.5 1

**Figure 2-6g**
Fall 2012 Fish Sampling Locations
2012 Water and Fish Data Summary Report
General Electric Company

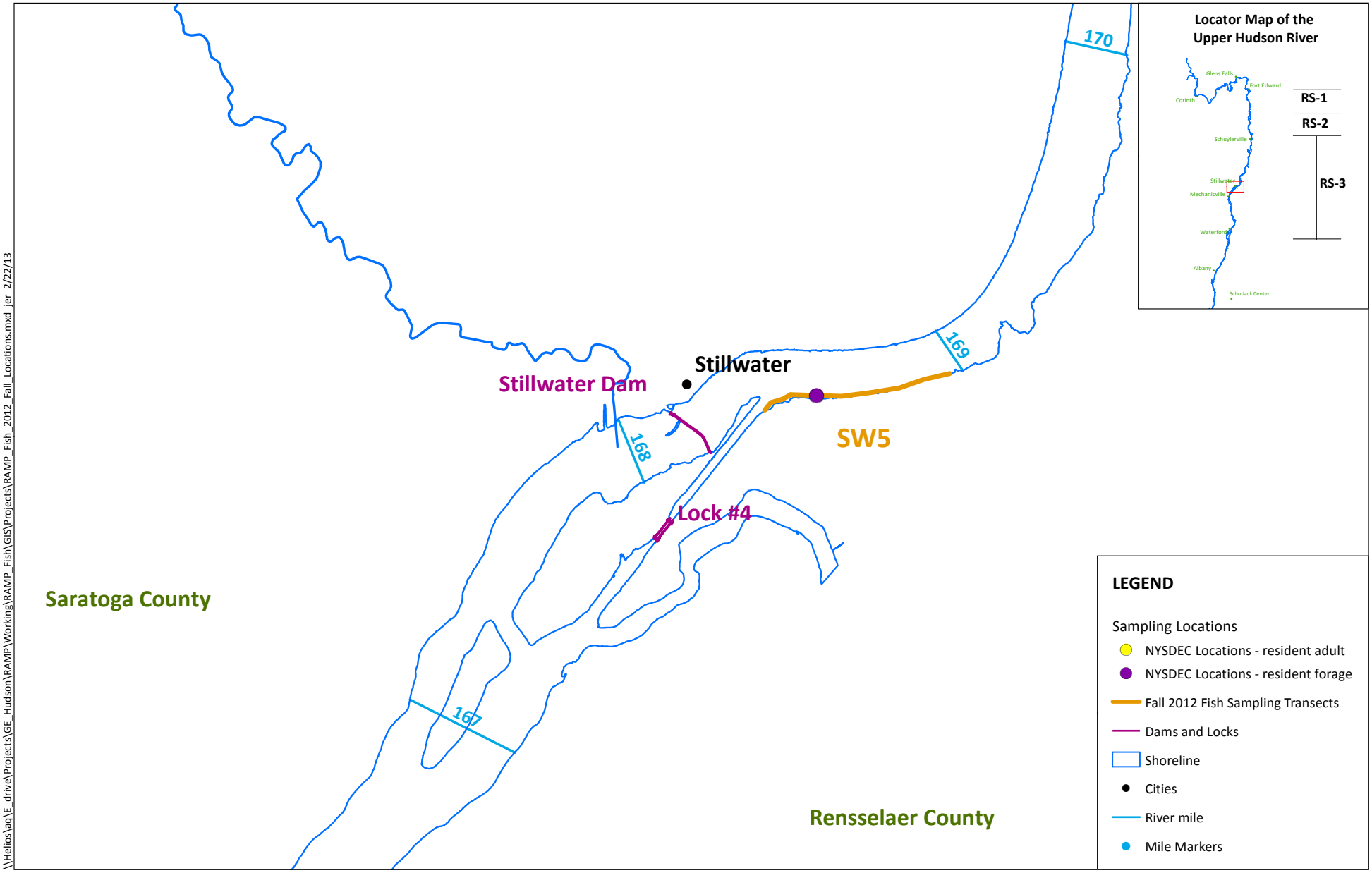


**Figure 2-6h**
Fall 2012 Fish Sampling Locations
2012 Water and Fish Data Summary Report
General Electric Company

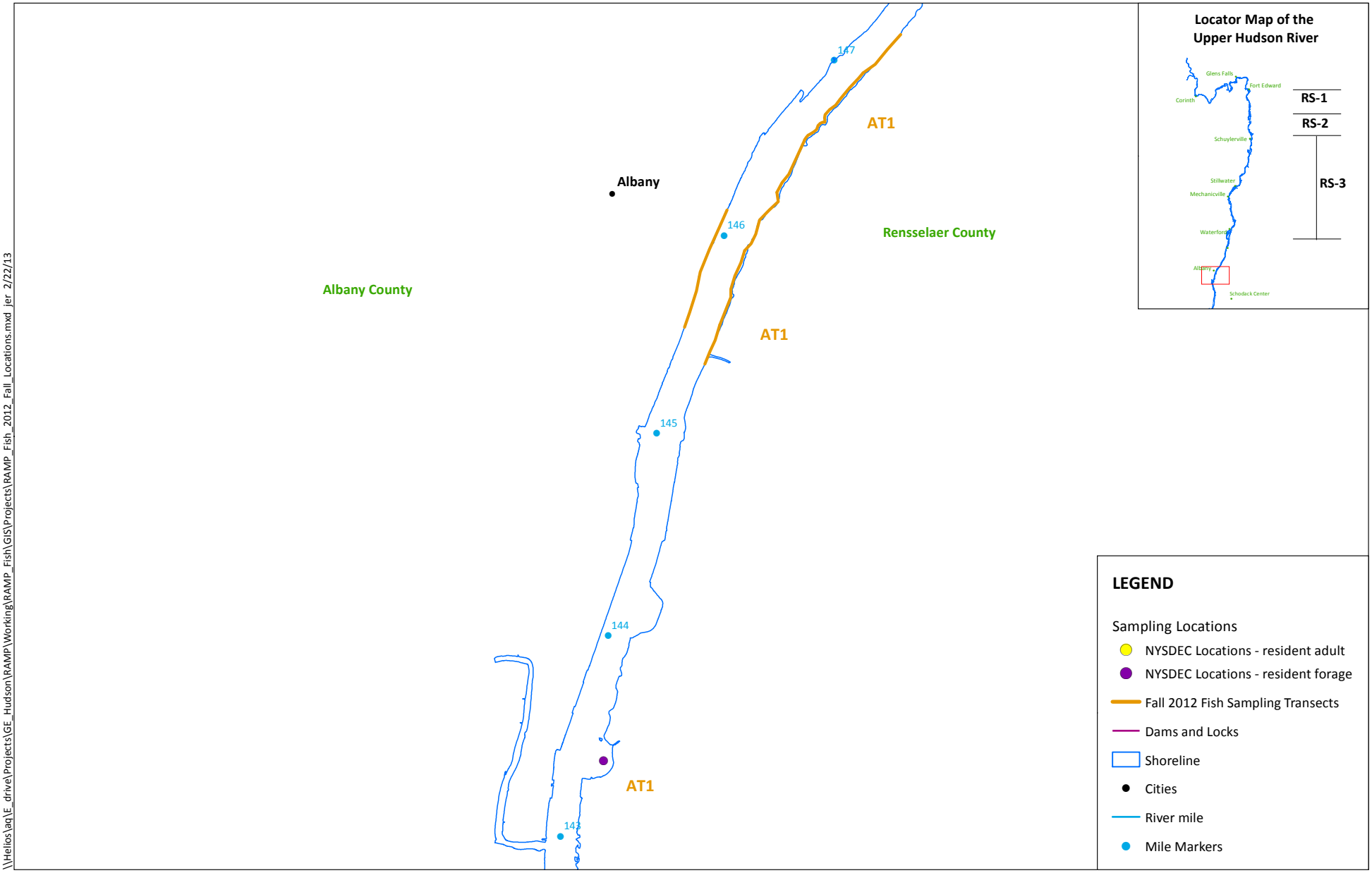


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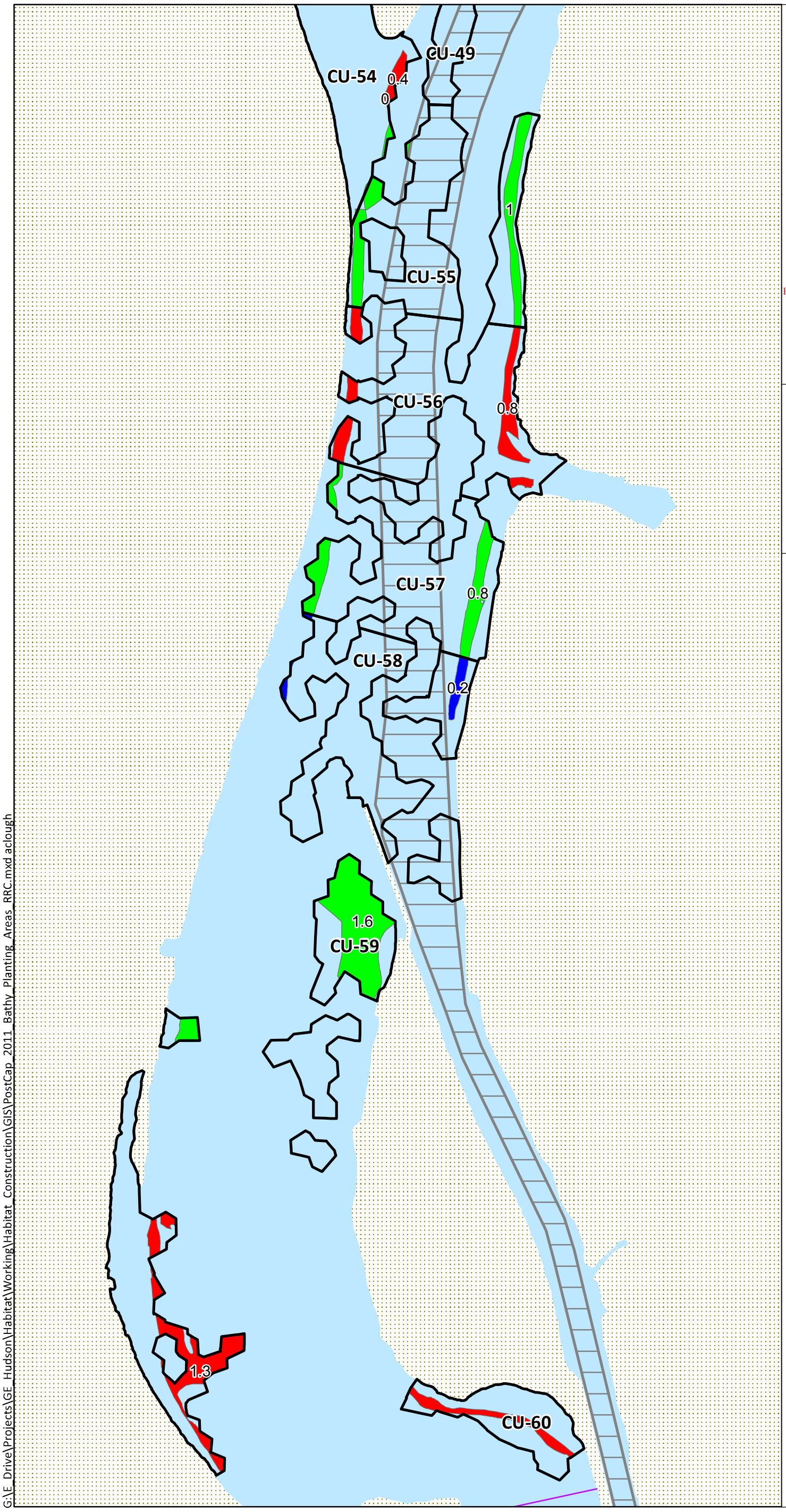
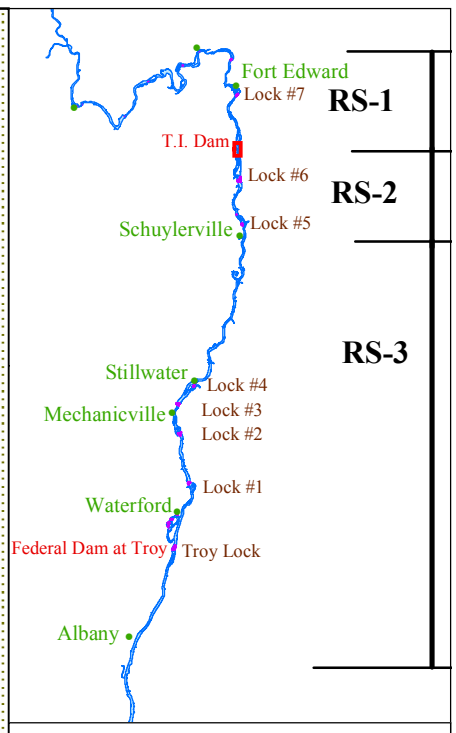
**Figure 2-6i**
Fall 2012 Fish Sampling Locations
2012 Water and Fish Data Summary Report
General Electric Company




**NOTES:**
Total PCB values based on area-weighted average surface concentrations of pre-2012 SSAP/SEDC design cores (using thiessen polygons). Areas clipped to SAV beds. Labels represent acres on a CU basis.

## Legend

Average Surface Total PCB (ppm)

- <= 15
- 15 - 50
- > 50
- Certification Units
- Navigation Channel
- Dams and Locks
- Hudson River
- Land

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Feet
0 140 280 560

**Figure 2-7**
Submerged Aquatic Vegetation Sampling Locations
2012 Water and Fish Data Summary Report
General Electric Company

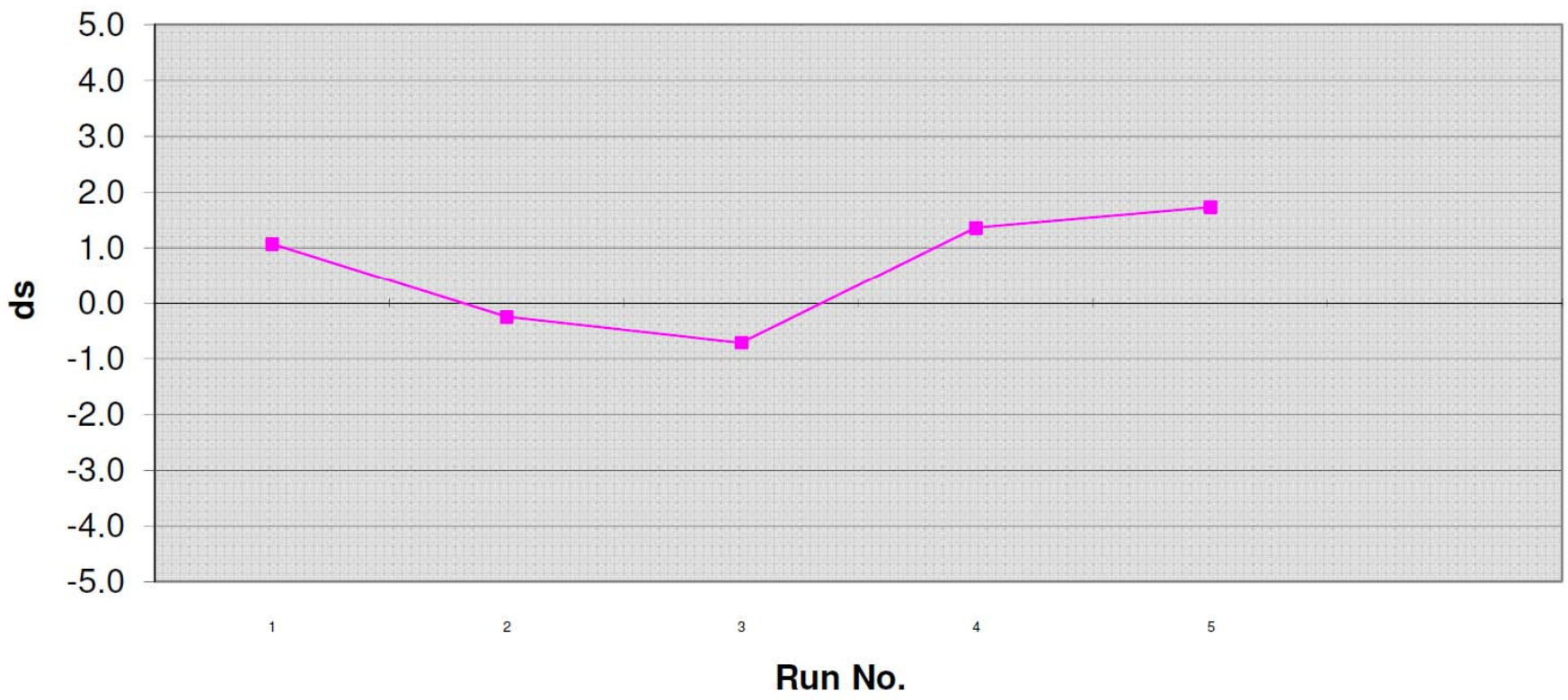


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**Figure 3-1**
GEHR8082 PE Control Chart - 2012 DDS Program Sediment Samples - Total PCBs
2012 Water and Fish Data Summary Report
General Electric Company

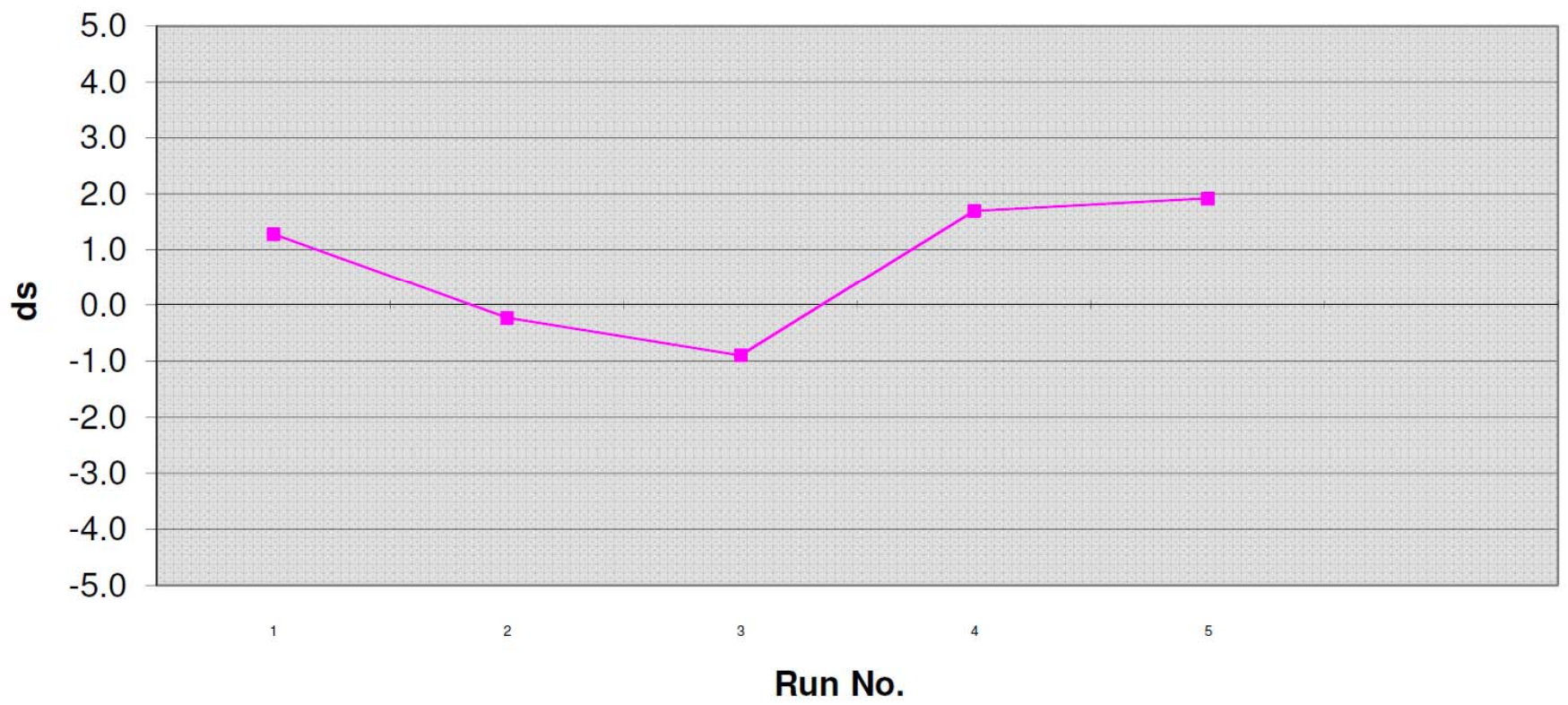


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**Figure 3-2**
GEHR8082 PE Control Chart - 2012 DDS Program Sediment Samples - Aroclor 1221
2012 Water and Fish Data Summary Report
General Electric Company

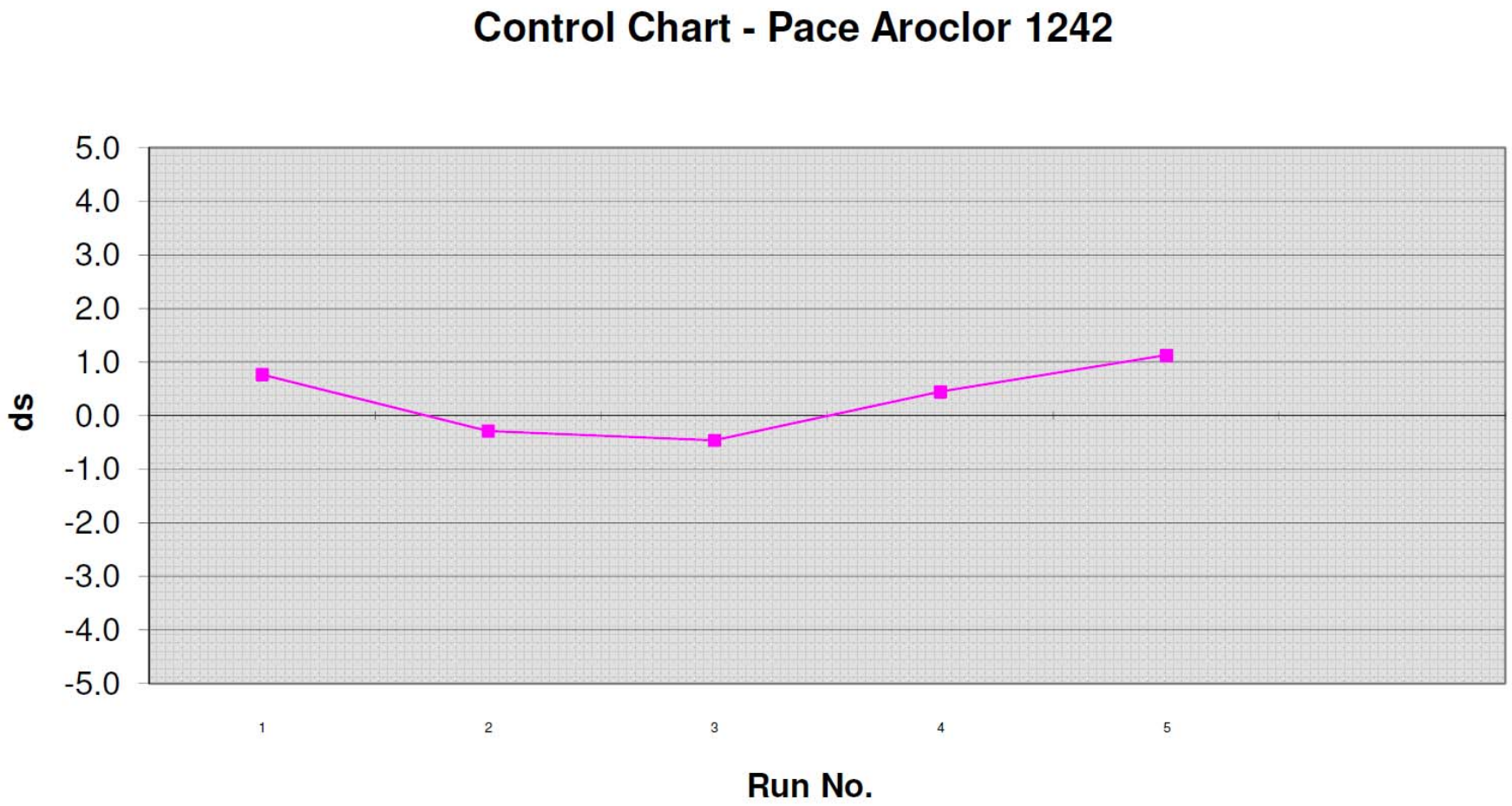





**Figure 3-3**
GEHR8082 PE Control Chart - 2012 DDS Program Sediment Samples - Aroclor 1242
2012 Water and Fish Data Summary Report
General Electric Company

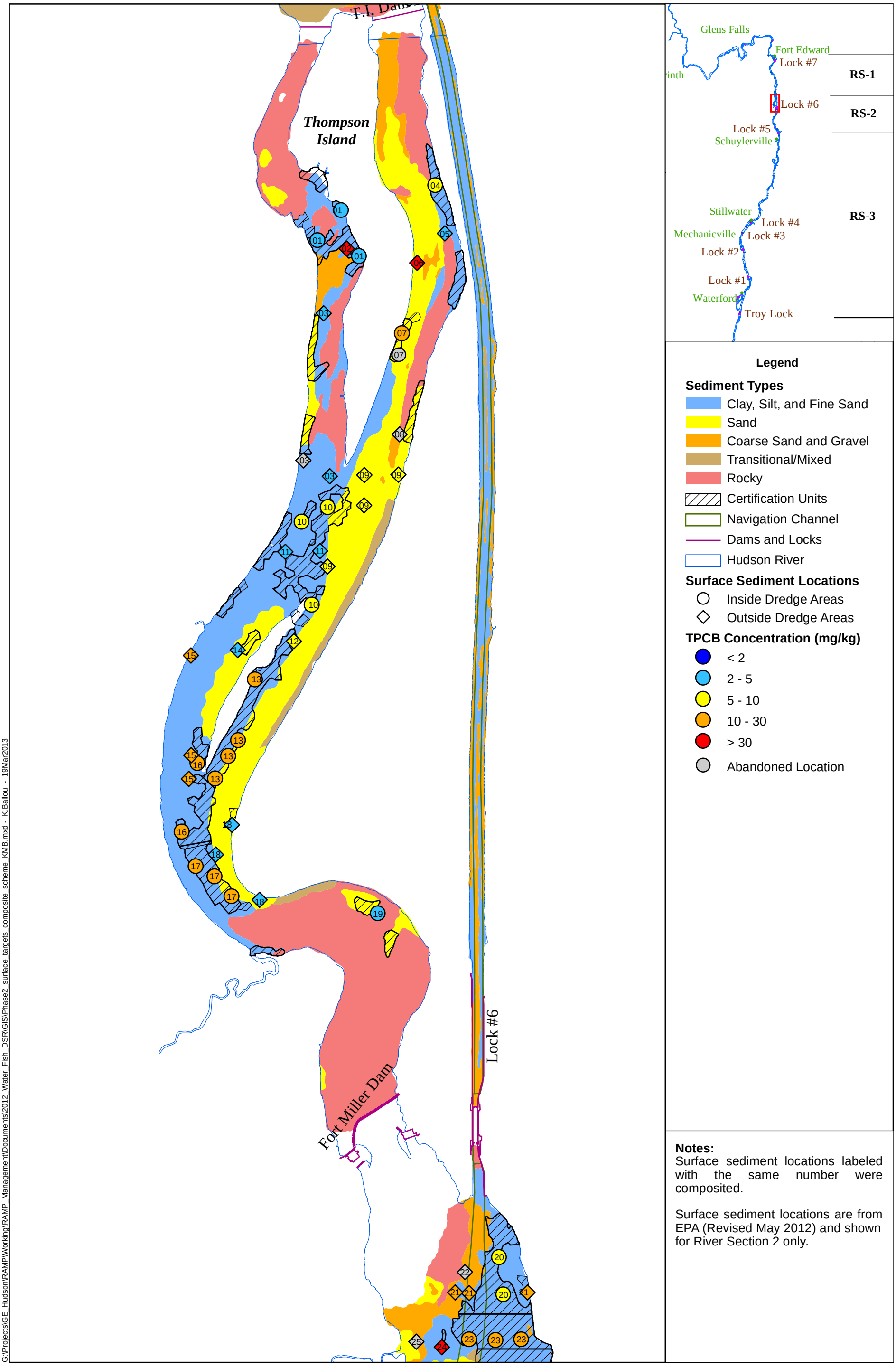



**Figure 4-1a**
Spring Surface Sediment Total PCB Results
2012 Water and Fish Data Summary Report
General Electric Company

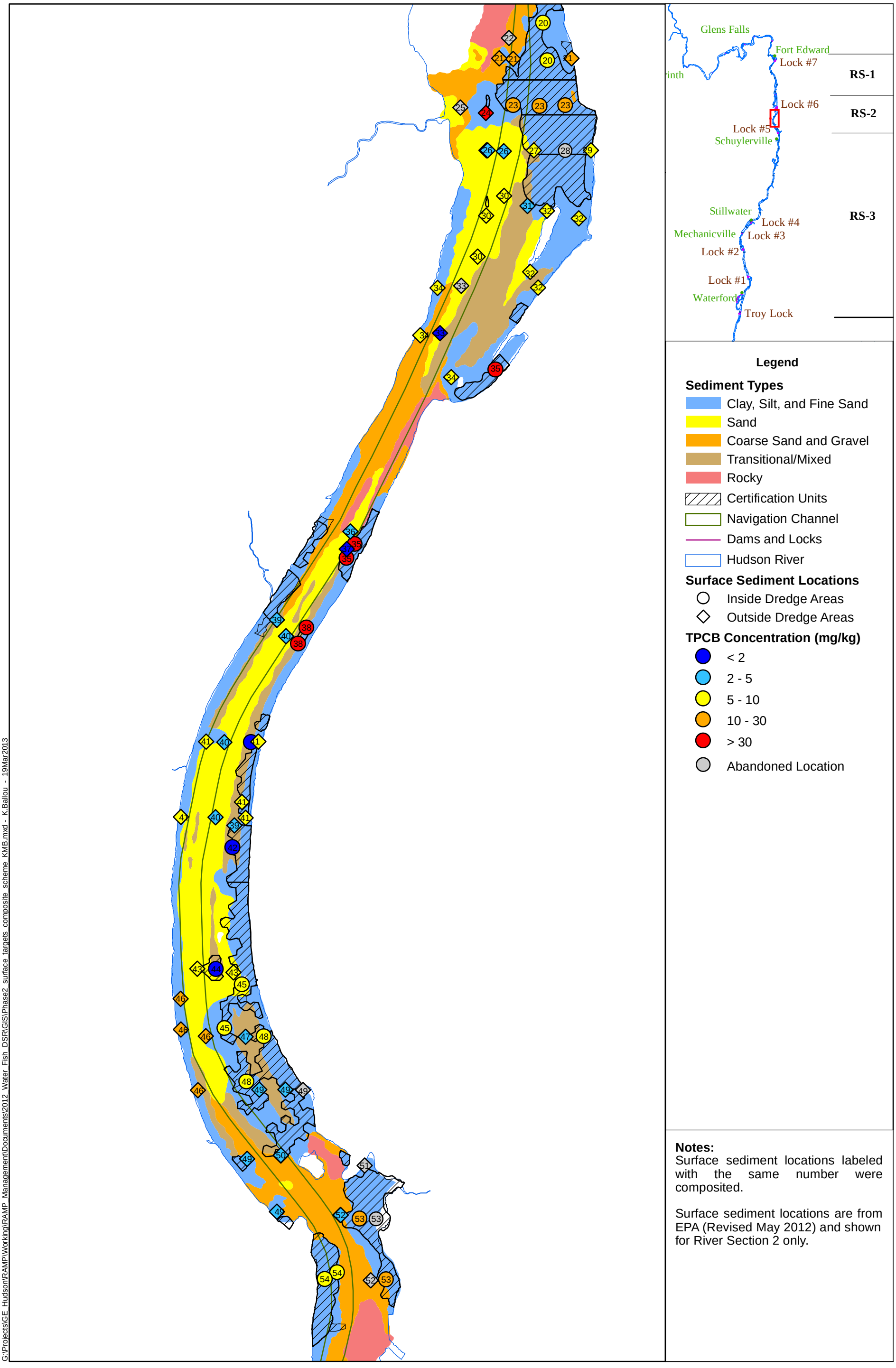



**Figure 4-1b**
Spring Surface Sediment Total PCB Results
2012 Water and Fish Data Summary Report
General Electric Company

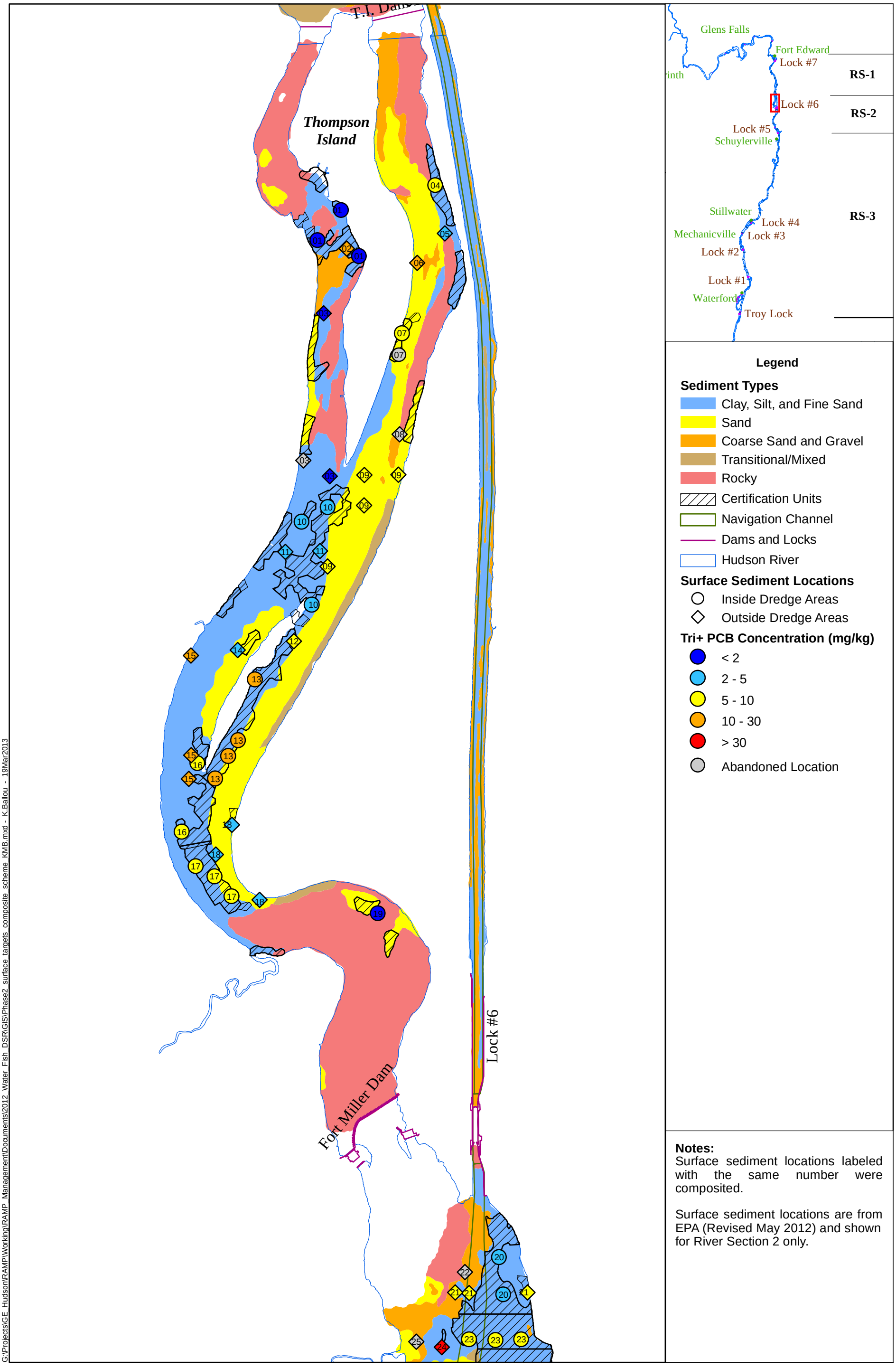



**Figure 4-1c**
Spring Surface Sediment Tri+ PCB Results
2012 Water and Fish Data Summary Report
General Electric Company

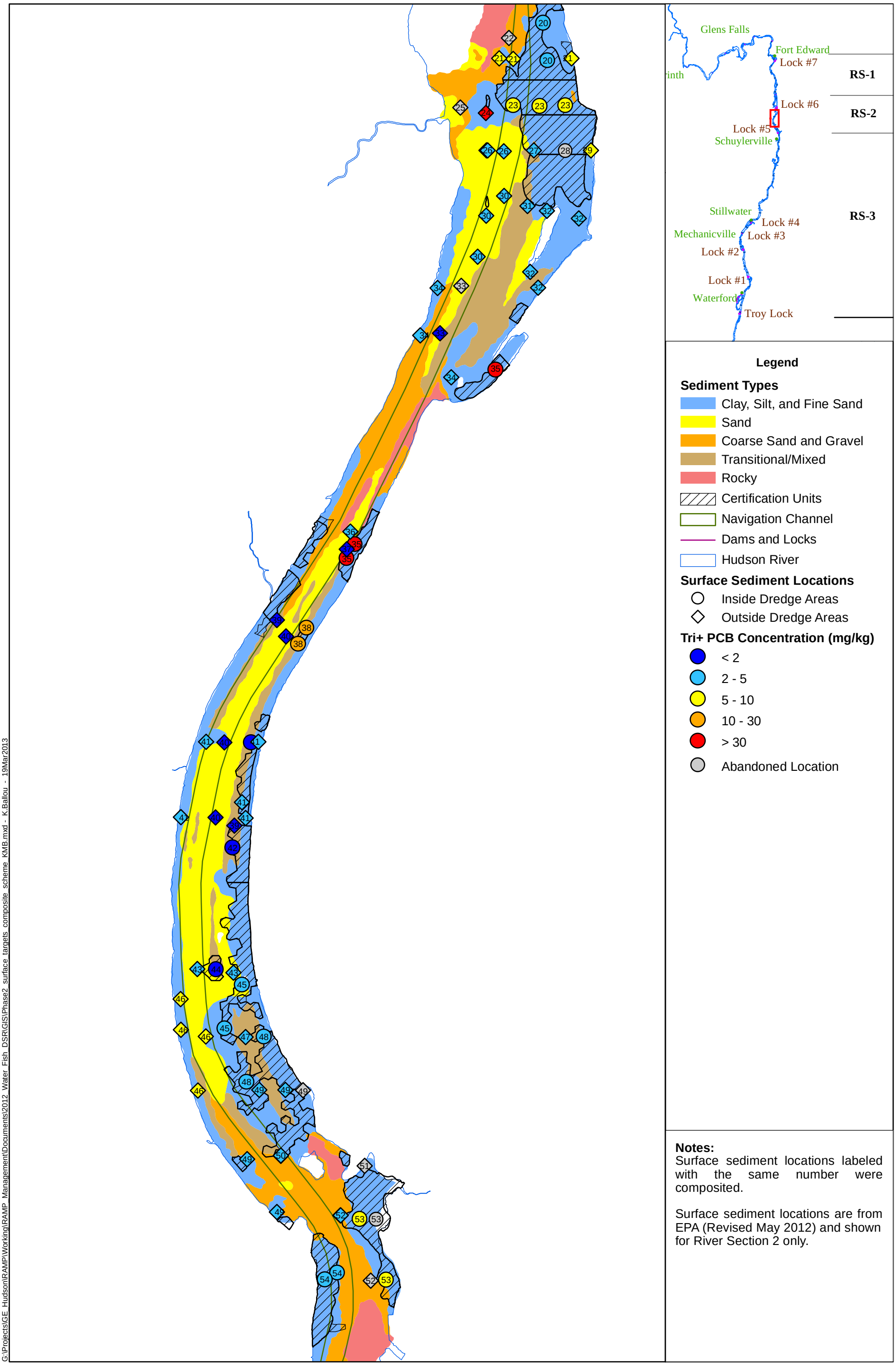



**Figure 4-1d**
Spring Surface Sediment Tri+ PCB Results
2012 Water and Fish Data Summary Report
General Electric Company

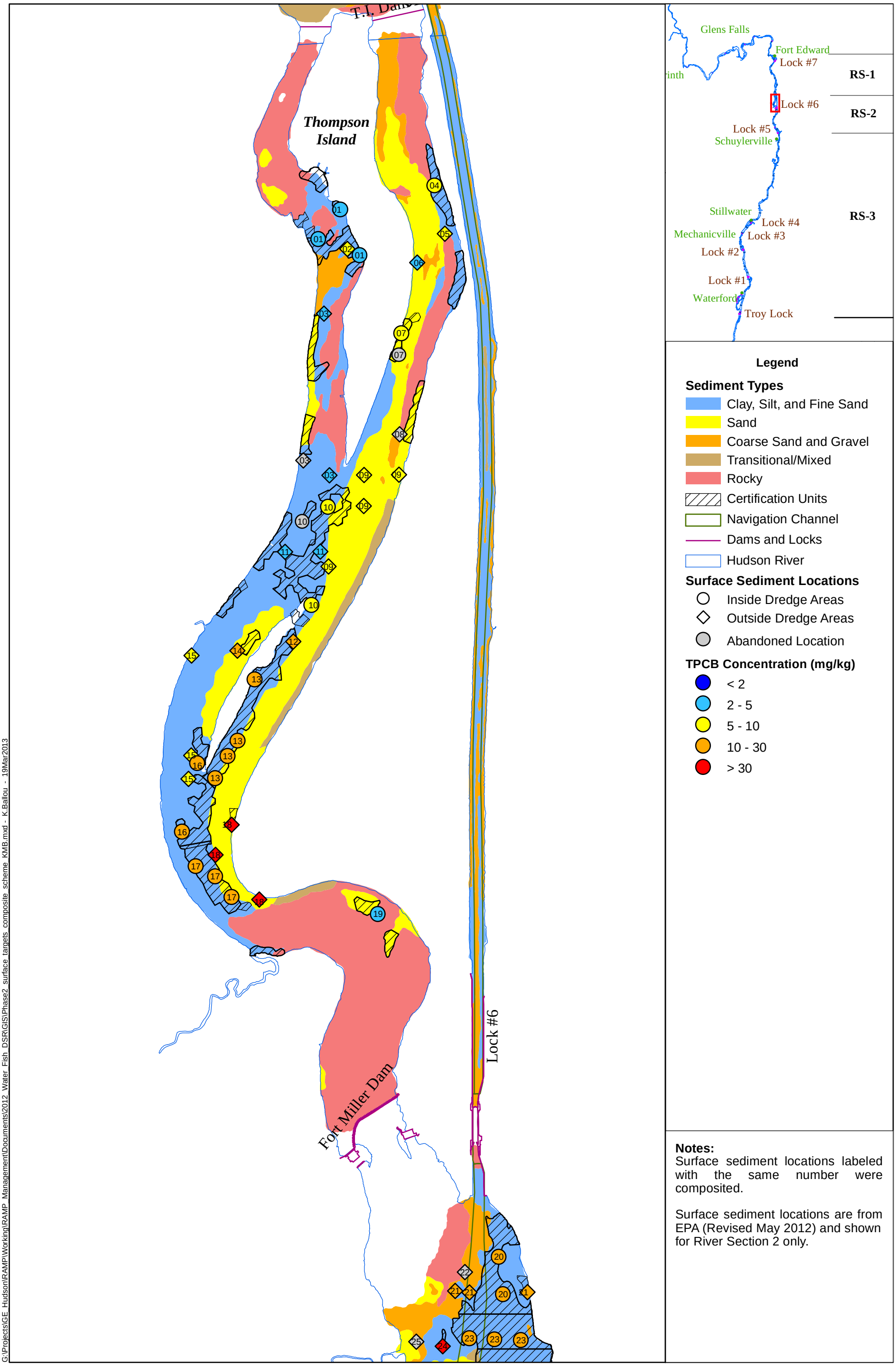



**Figure 4-2a**
Fall Surface Sediment Total PCB Results
2012 Water and Fish Data Summary Report
General Electric Company

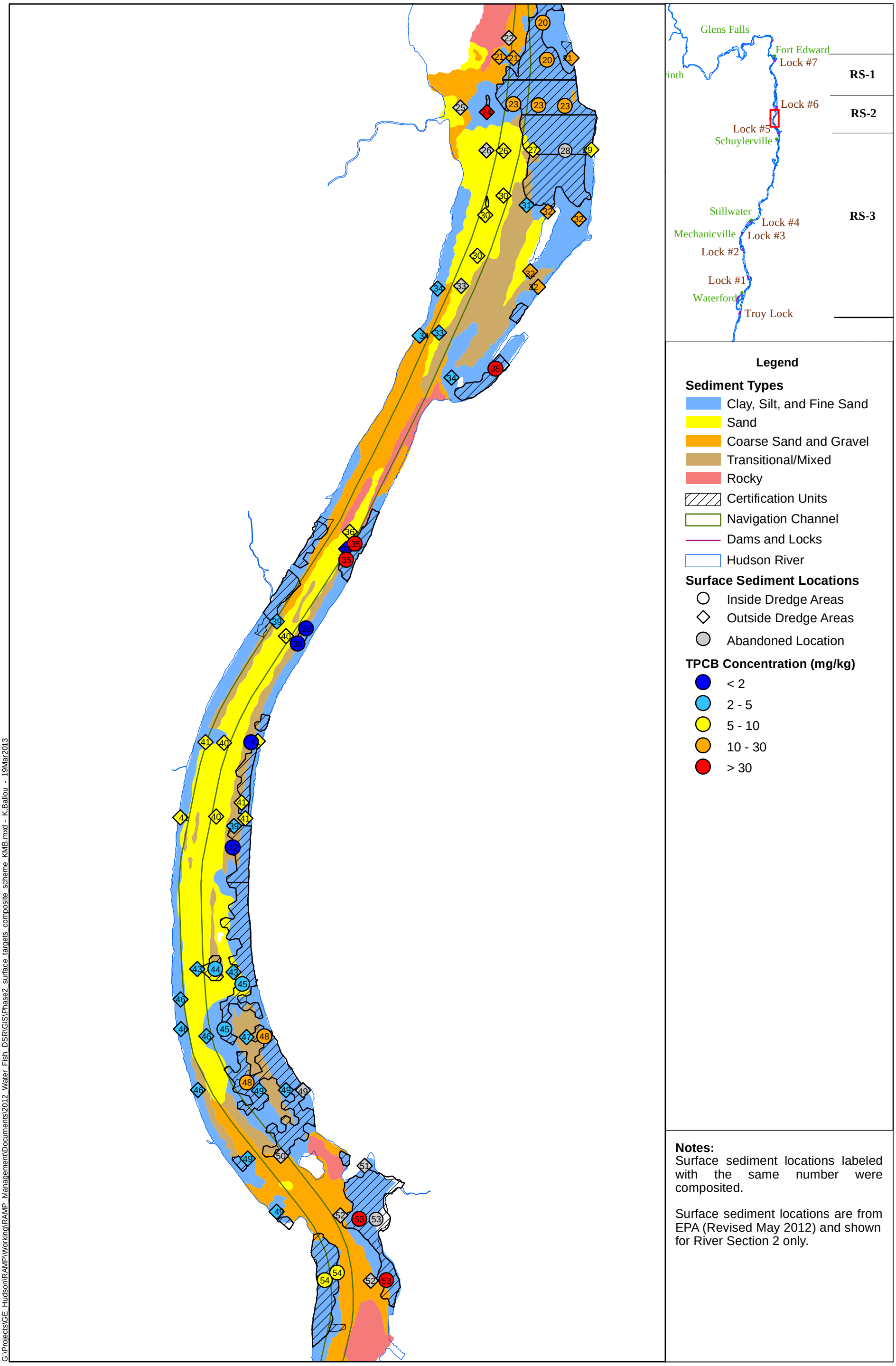



**Figure 4-2b**
Fall Surface Sediment Total PCB Results
2012 Water and Fish Data Summary Report
General Electric Company

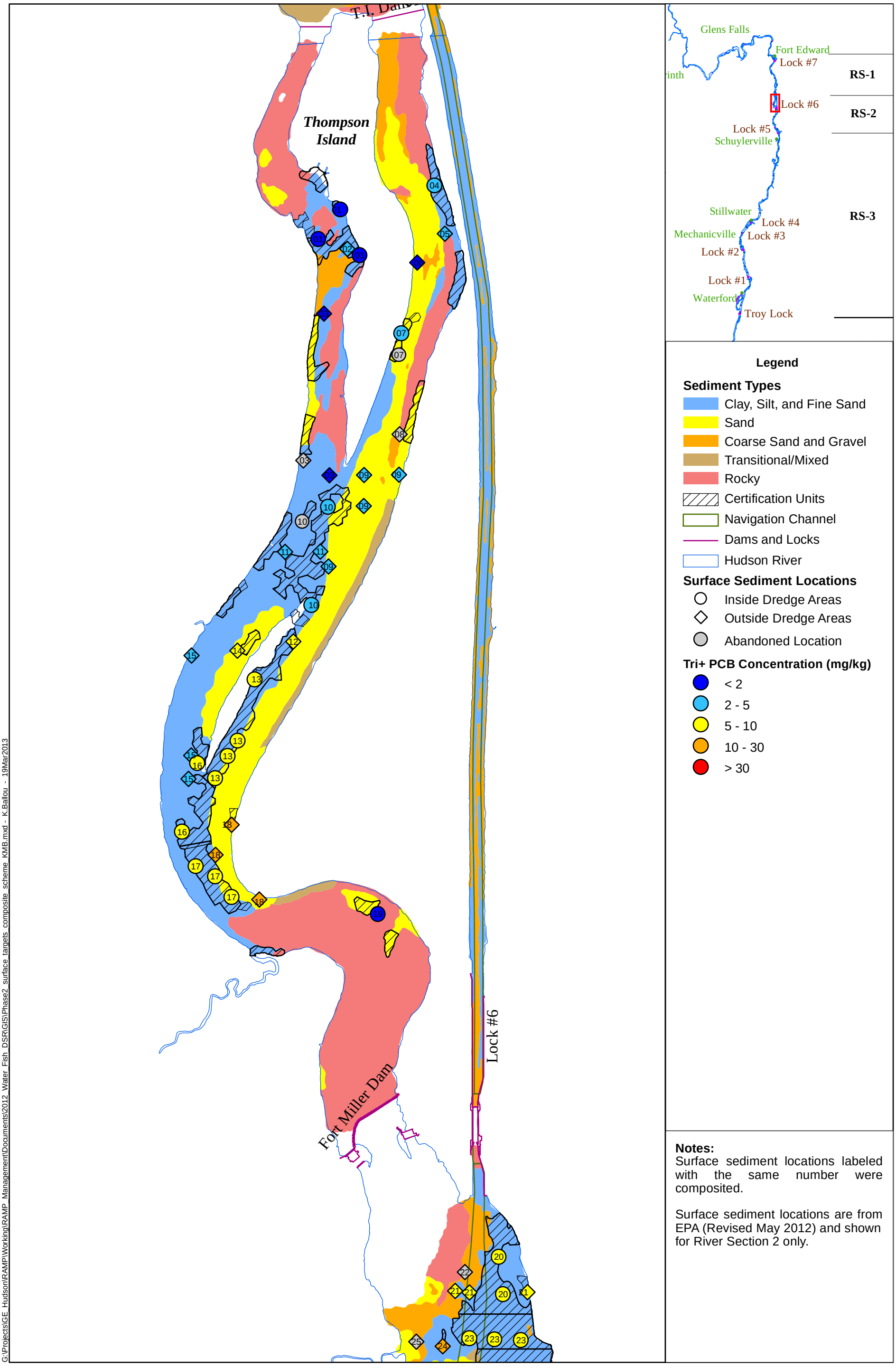



**Figure 4-2c**
Fall Surface Sediment Tri+ PCB Results
2012 Water and Fish Data Summary Report
General Electric Company

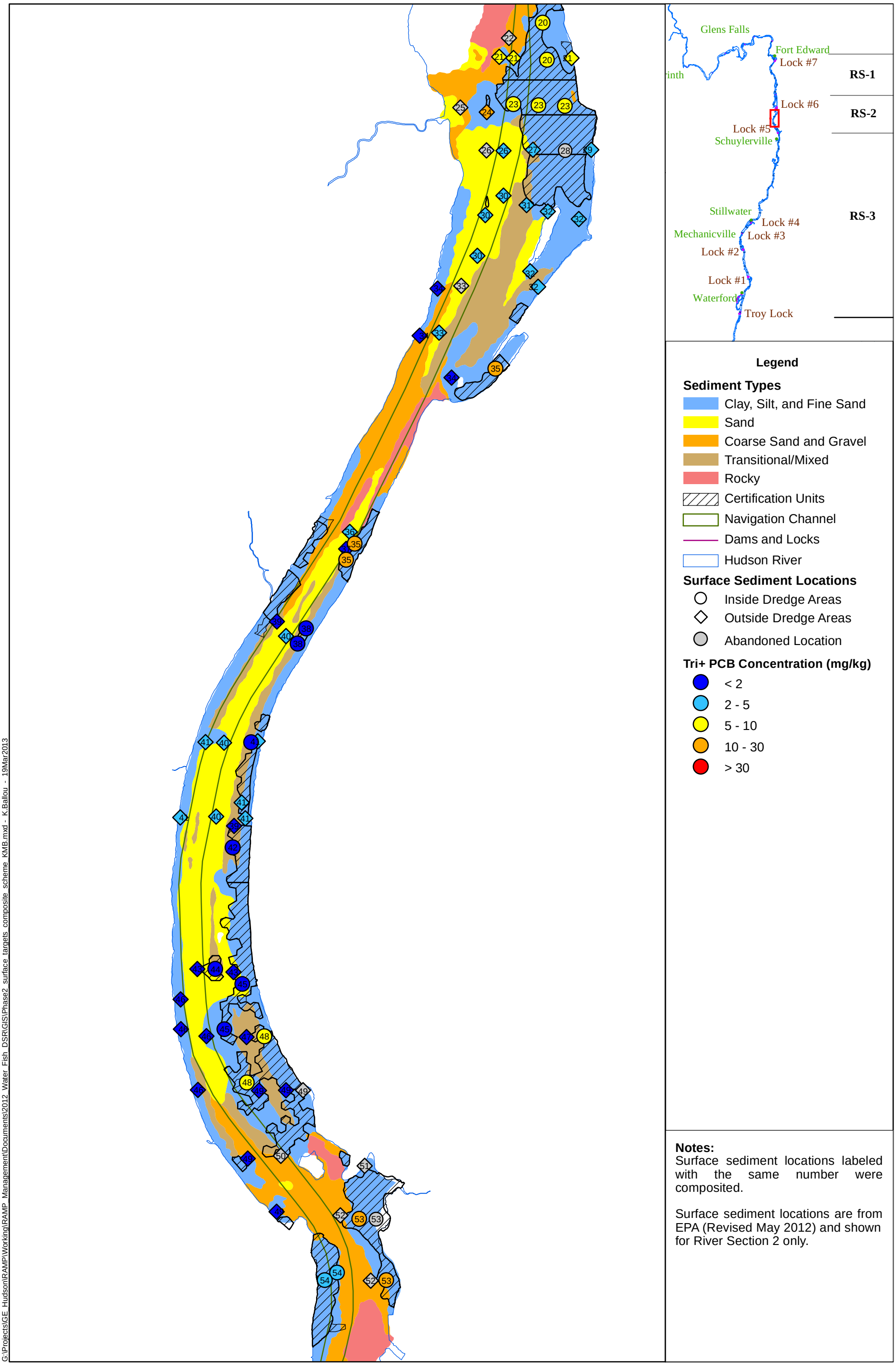
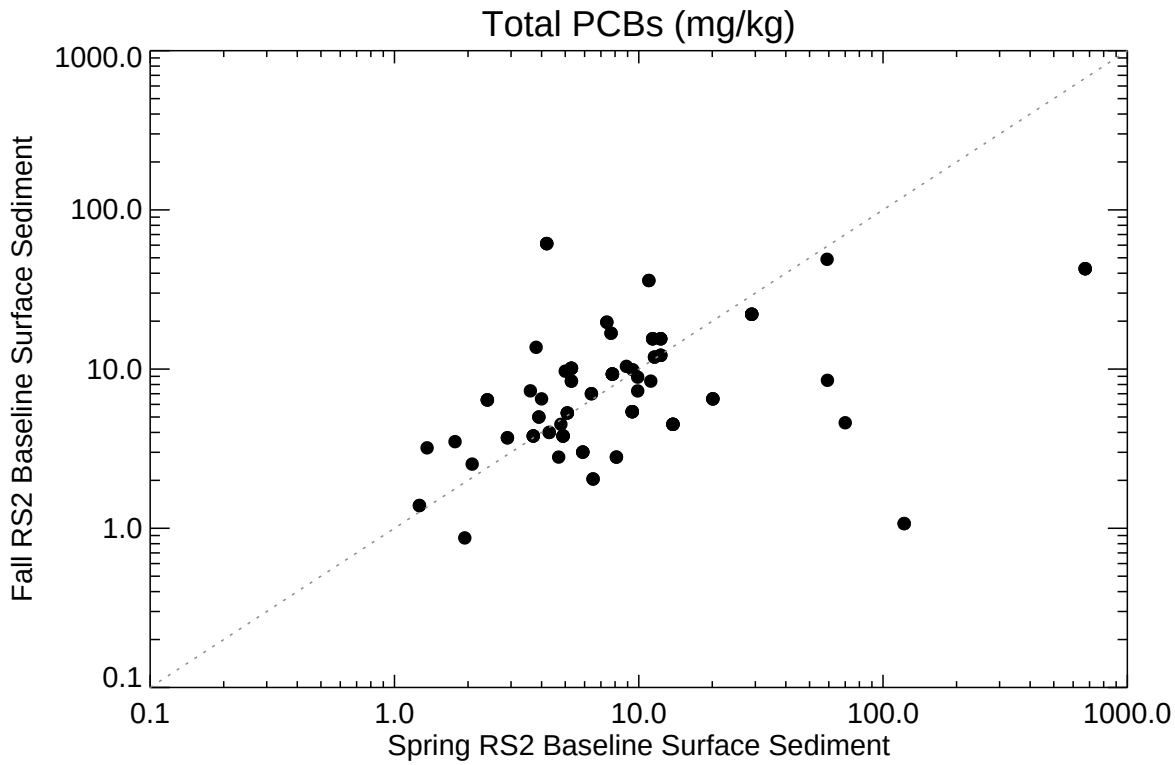



**Figure 4-2d**
Fall Surface Sediment Tri+ PCB Results
2012 Water and Fish Data Summary Report
General Electric Company



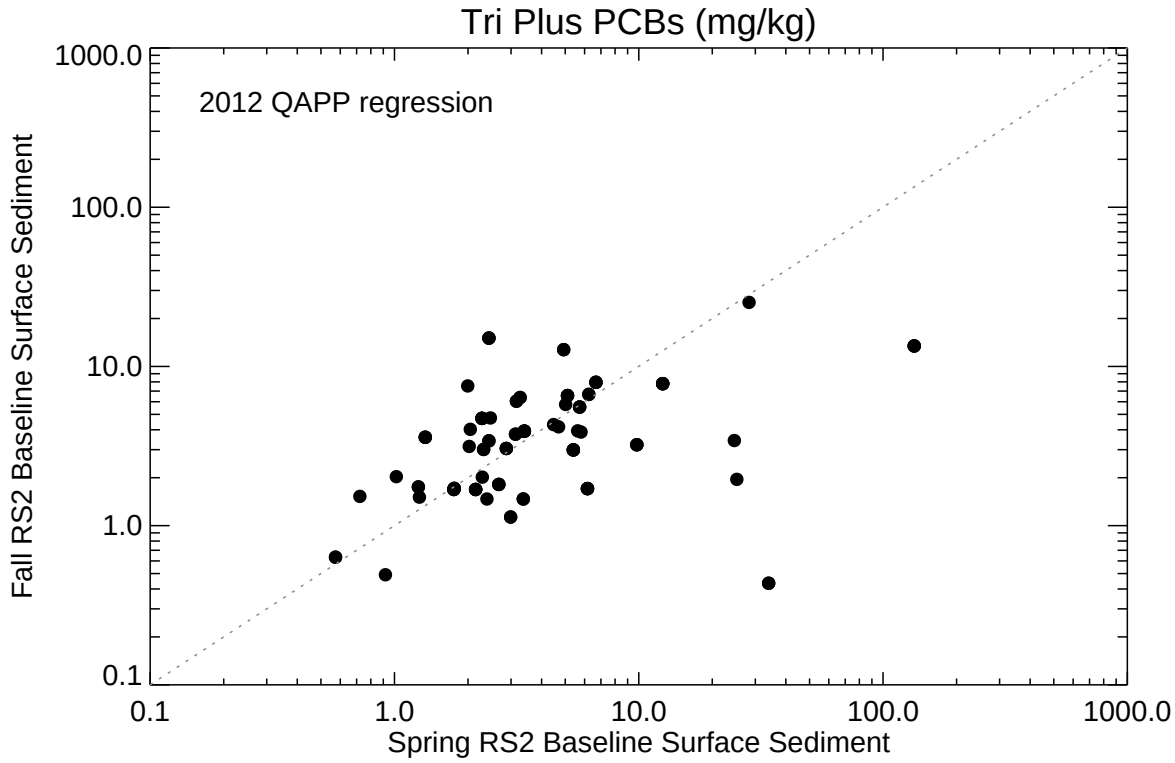
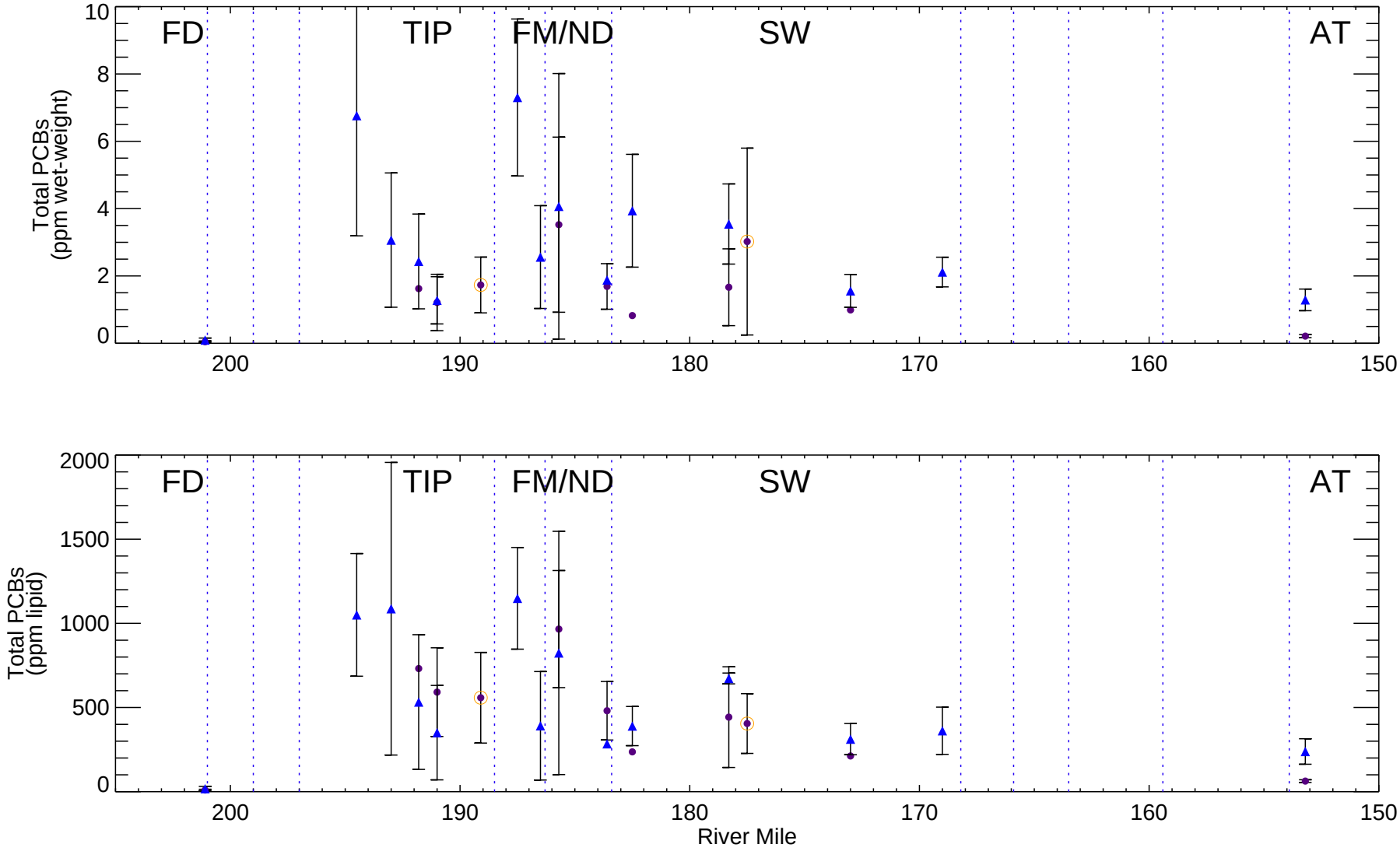




**Figure 4-3**

Comparison of PCBs in Surface Sediment (0-2 in) for Spring and Fall 2012
Non-detects were set to zero for aroclor summing. Duplicates were averaged.
2012 Water and Fish Data Summary Report
General Electric Company

KMB - G:\Projects\GE_Hudson\RAMP\Working\RAMP_Management\Documents\2012_Water_Fish_DSR\IDL\Surface_sed_crossplots_2012.pro
Tue Mar 19 14:49:29 2013




largemouth bass
smallmouth bass

**Figure 4-4**

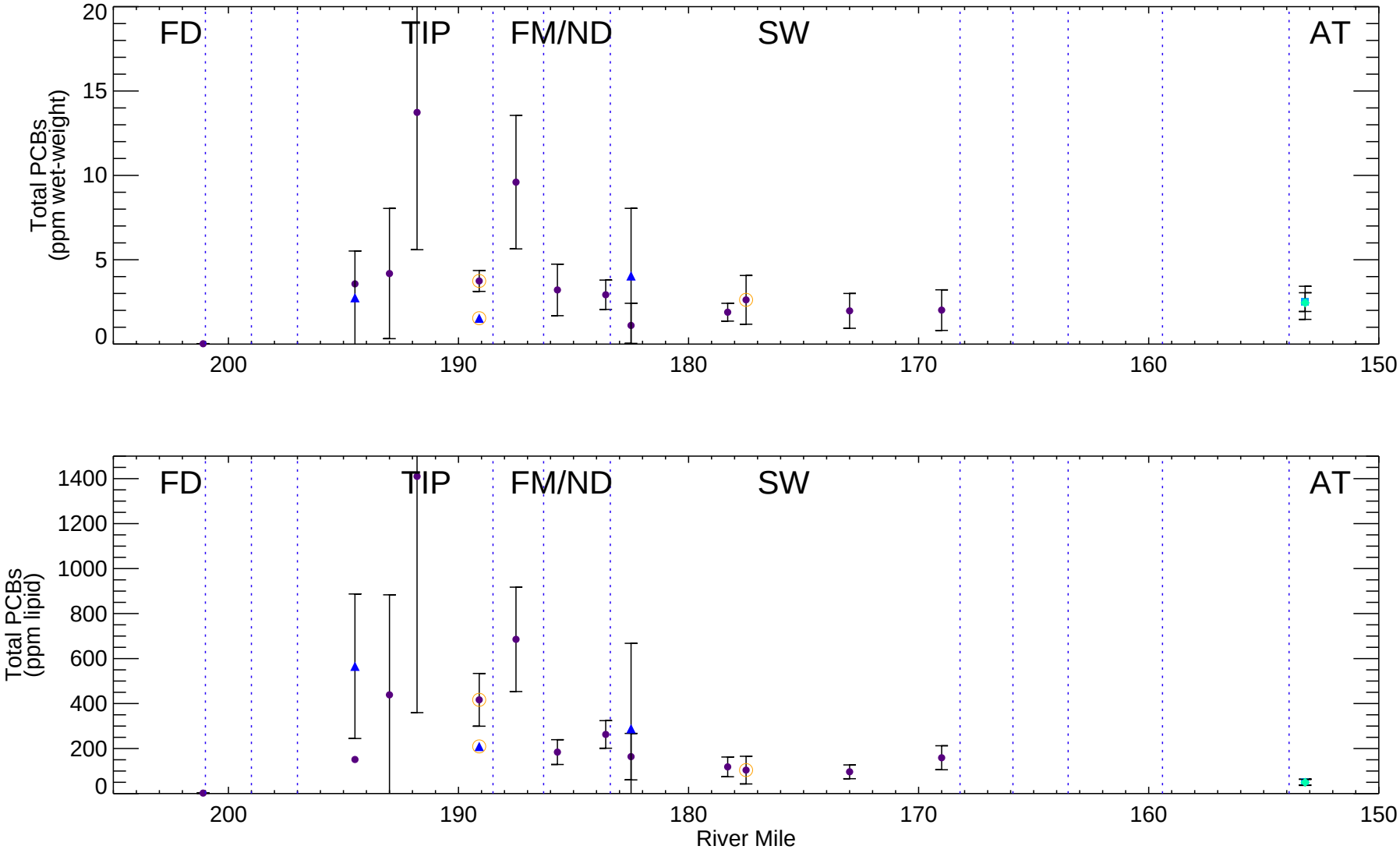
Spatial Patterns in PCB Concentrations in Black Bass

Data points represent arithmetic mean +/- 2 standard error of the mean. Year: 2012. Prep: fillet
Blue dotted lines indicate approximate dam locations. Orange circles indicate historic sampling locations.

2012 Water and Fish Data Summary Report
General Electric Company

ANCHOR QEA

ELP - \\Helios\e_drive\Projects\GE_Hudson\RAMP\Working\RAMP_Fish\Analysis\Spatial\2012\hr_target_fish_spat_PCB_uhr_2012_by_spp.pro
Mon Mar 18 11:43:14 2013




brown bullhead
yellow bullhead
channel catfish
white catfish

**Figure 4-5**

Spatial Patterns in PCB Concentrations in Ictalurids

Data points represent arithmetic mean +/- 2 standard error of the mean. Year: 2012. Prep: fillet
Blue dotted lines indicate approximate dam locations. Orange circles indicate historic sampling locations.

2012 Water and Fish Data Summary Report
General Electric Company

ANCHOR QEA

ELP - \\Helios\e_drive\Projects\GE_Hudson\RAMP\Working\RAMP_Fish\Analysis\Spatial\2012\hr_target_fish_spat_PCB_uhr_2012_by_spp.pro
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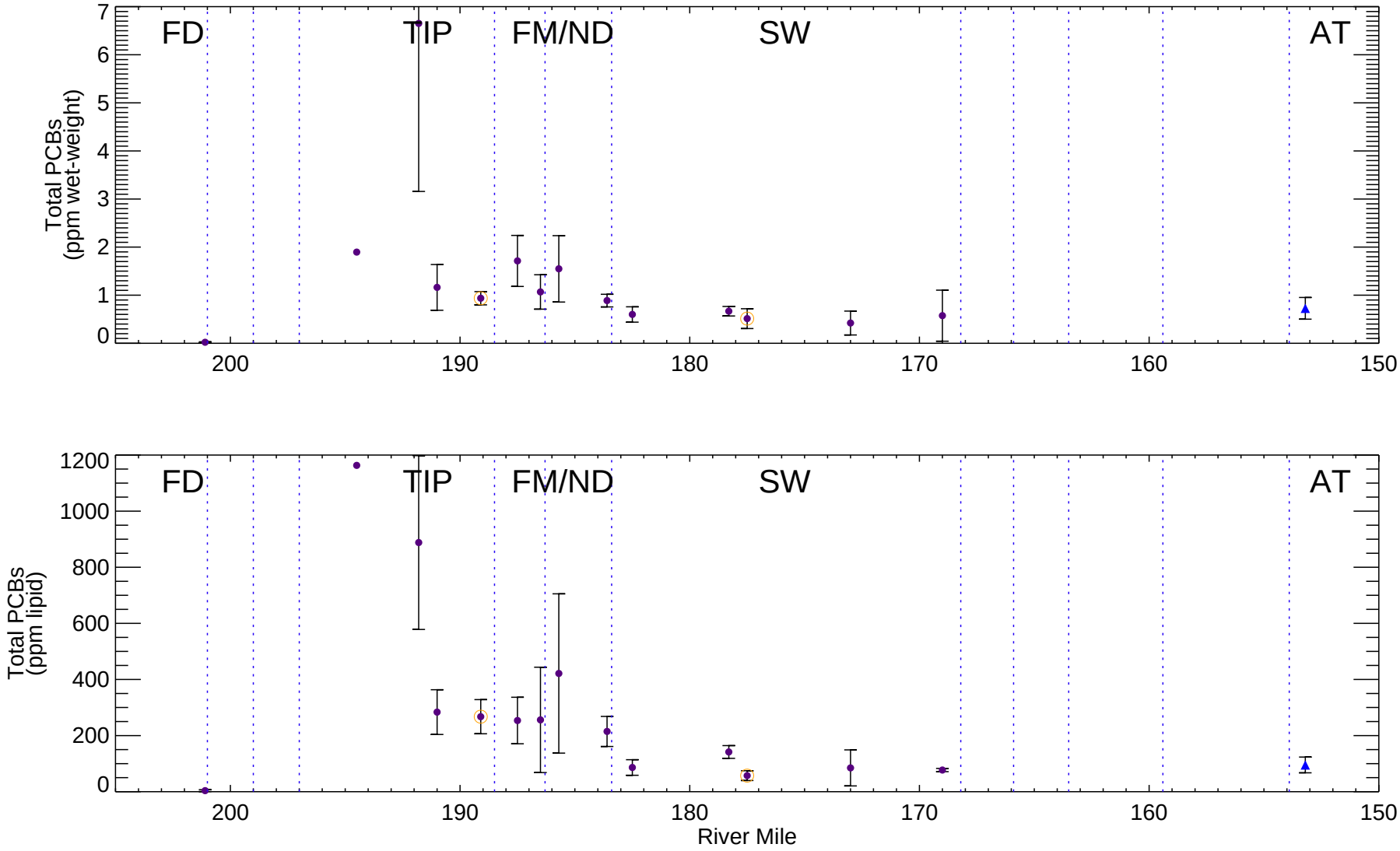



**Figure 4-6**

Spatial Patterns in PCB Concentrations in Perch

Data points represent arithmetic mean +/- 2 standard error of the mean. Year: 2012. Prep: fillet
Blue dotted lines indicate approximate dam locations. Orange circles indicate historic sampling locations.

2012 Water and Fish Data Summary Report
General Electric Company

ANCHOR QEA

ELP - \\Helios\e_drive\Projects\GE_Hudson\RAMP\Working\RAMP_Fish\Analysis\Spatial\2012\hr_target_fish_spat_PCB_uhr_2012_by_spp.pro
Mon Mar 18 11:43:15 2013

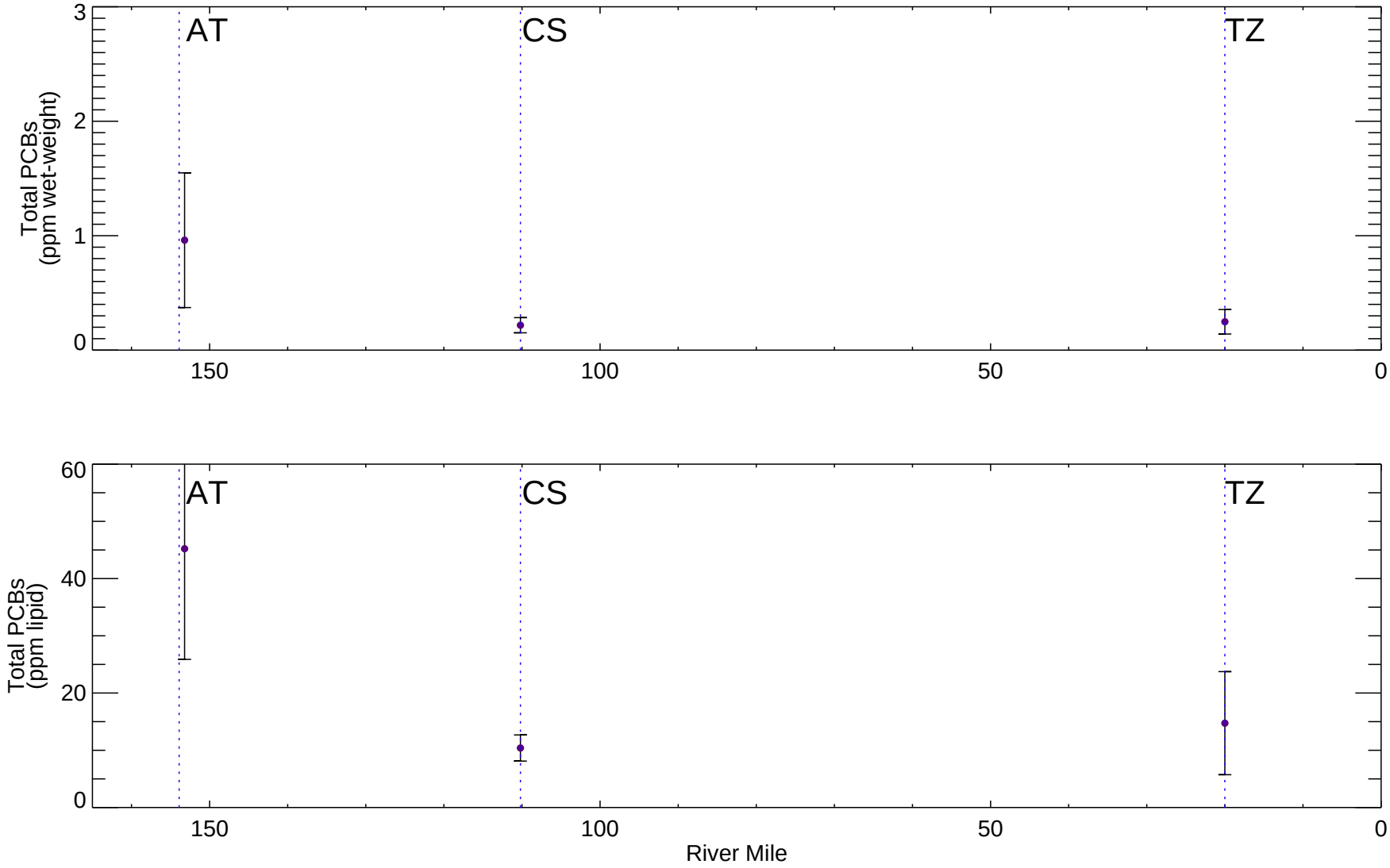



**Figure 4-7**

Spatial Patterns in PCB Concentrations in Striped Bass

Data points represent arithmetic mean +/- 2 standard error of the mean. Year: 2012. Prep: fillet
Blue dotted lines indicate approximate dam locations. Orange circles indicate historic sampling locations.

2012 Water and Fish Data Summary Report
General Electric Company

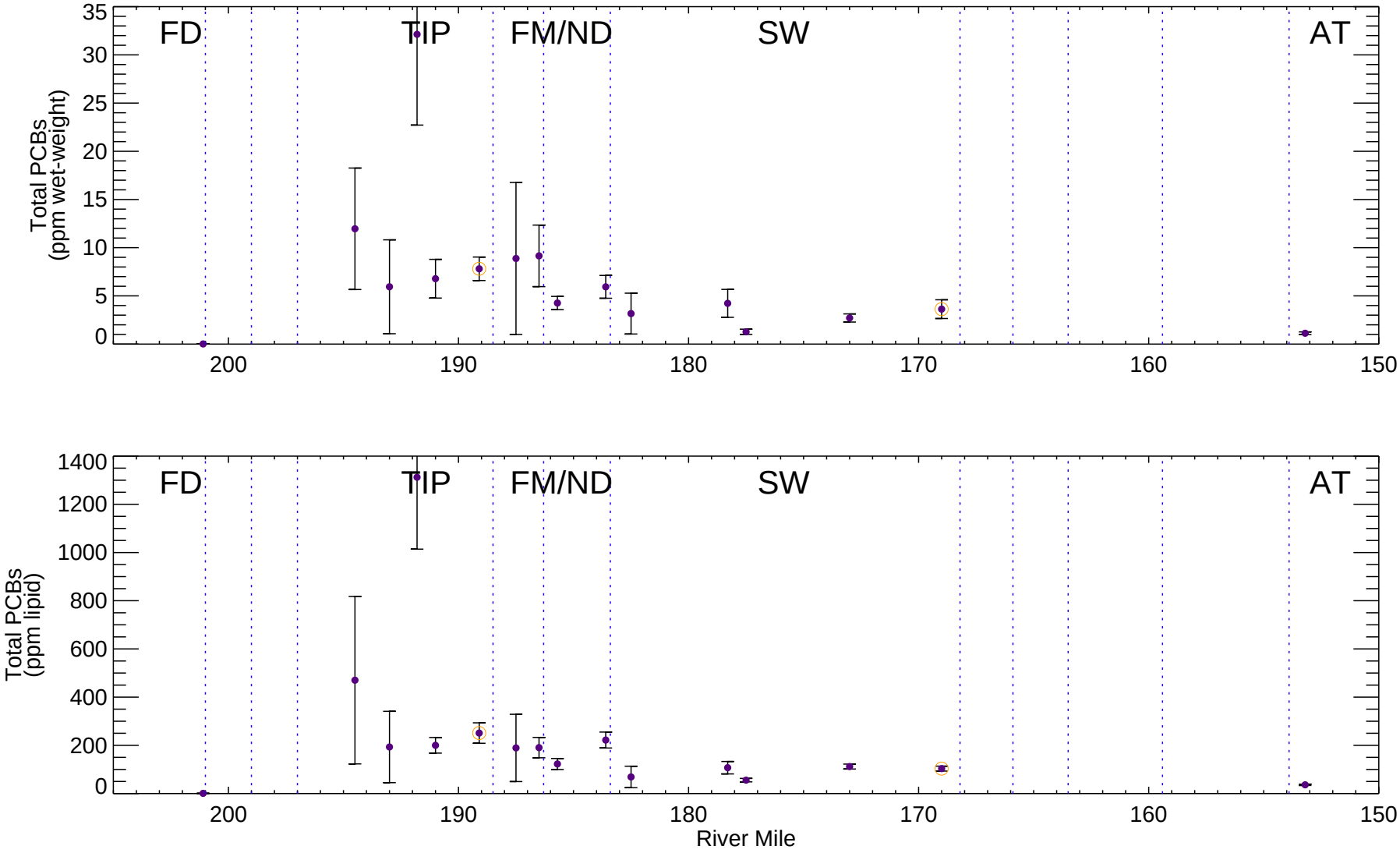



**Figure 4-8**

Spatial Patterns in PCB Concentrations in Pumpkinseed

Data points represent arithmetic mean +/- 2 standard error of the mean. Year: 2012. Prep: whole body
Blue dotted lines indicate approximate dam locations. Orange circles indicate historic sampling locations.

2012 Water and Fish Data Summary Report
General Electric Company

ANCHOR QEA

ELP - \\Helios\e_drive\Projects\GE_Hudson\RAMP\Working\RAMP_Fish\Analysis\Spatial\2012\hr_target_fish_spat_PCB_uhr_2012_by_spp.pro
Mon Mar 18 11:43:15 2013

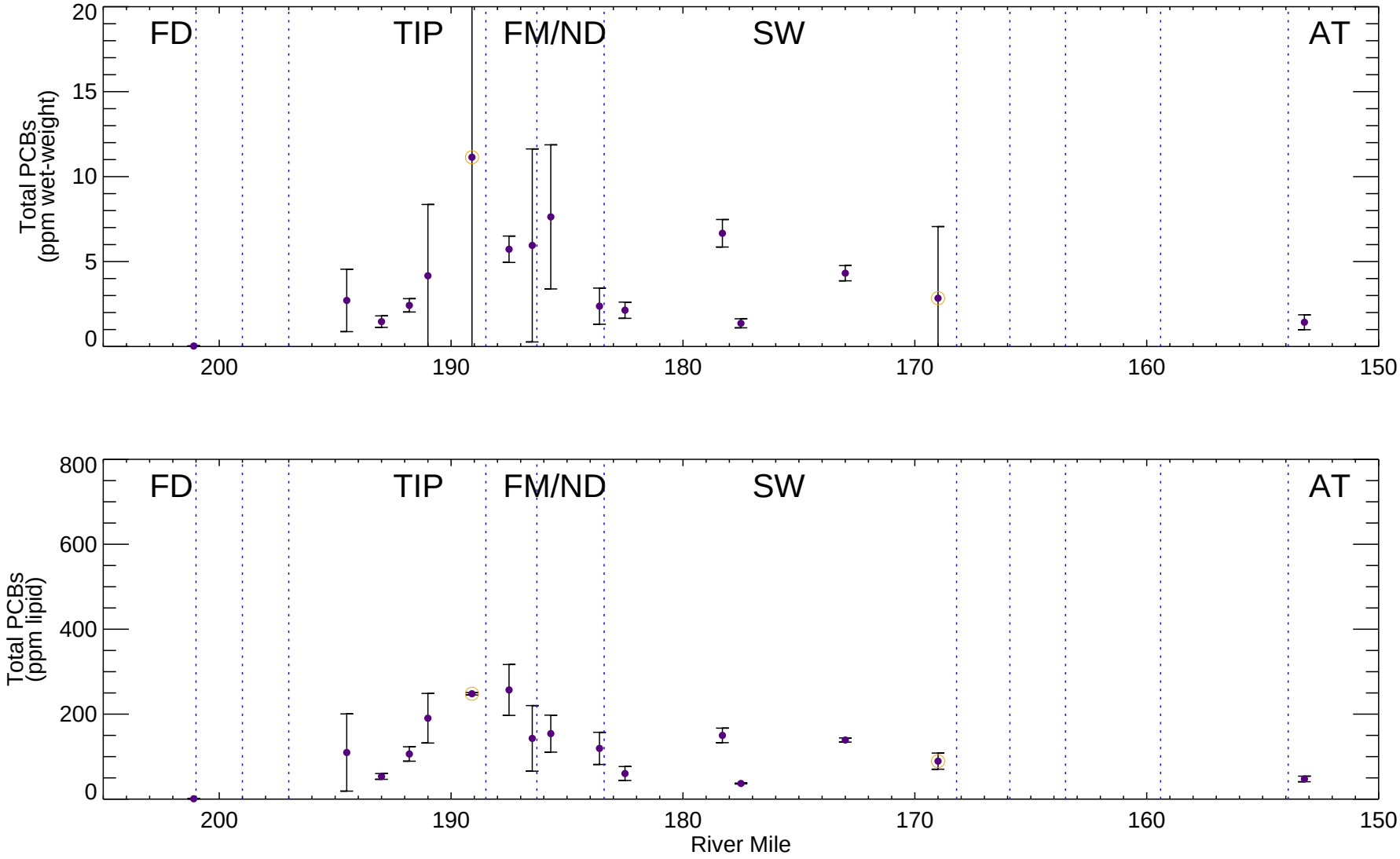



**Figure 4-9**

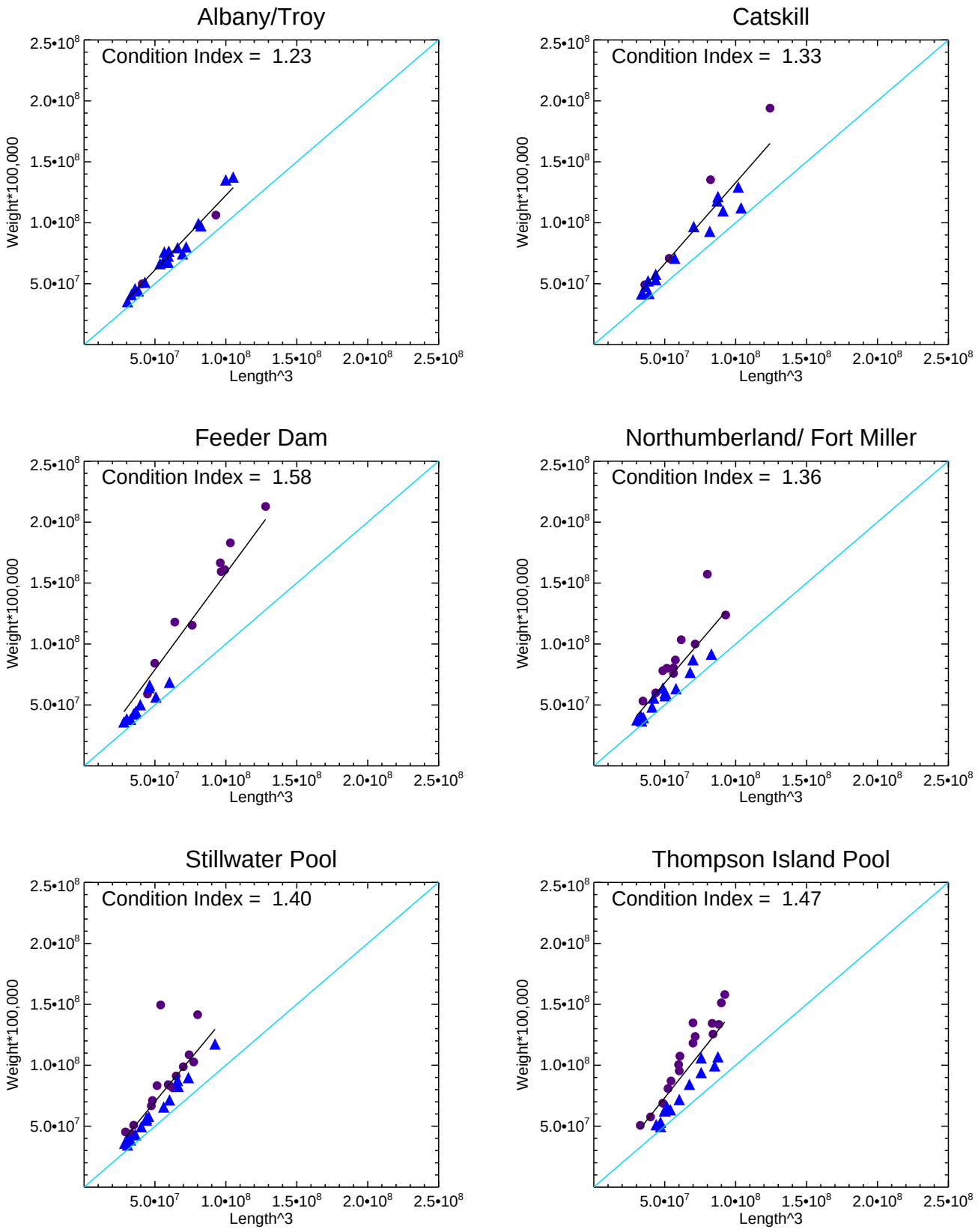
Spatial Patterns in PCB Concentrations in Forage Fish

Data points represent arithmetic mean +/- 2 standard error of the mean. Year: 2012. Prep: whole-body composite
Blue dotted lines indicate approximate dam locations. Orange circles indicate historic sampling locations.

2012 Water and Fish Data Summary Report
General Electric Company

ANCHOR QEA

ELP - \\Helios\e_drive\Projects\GE_Hudson\RAMP\Working\RAMP_Fish\Analysis\Spatial\2012\hr_target_fish_spat_PCB_uhr_2012_by_spp.pro
Mon Mar 18 11:43:15 2013




largemouth bass
smallmouth bass

**Figure 4-10**

Condition Index of Black Bass for Spring and Fall 2012 Sampling Events

Light blue line represents the 1:1 line.

2012 Water and Fish Data Summary Report
General Electric Company

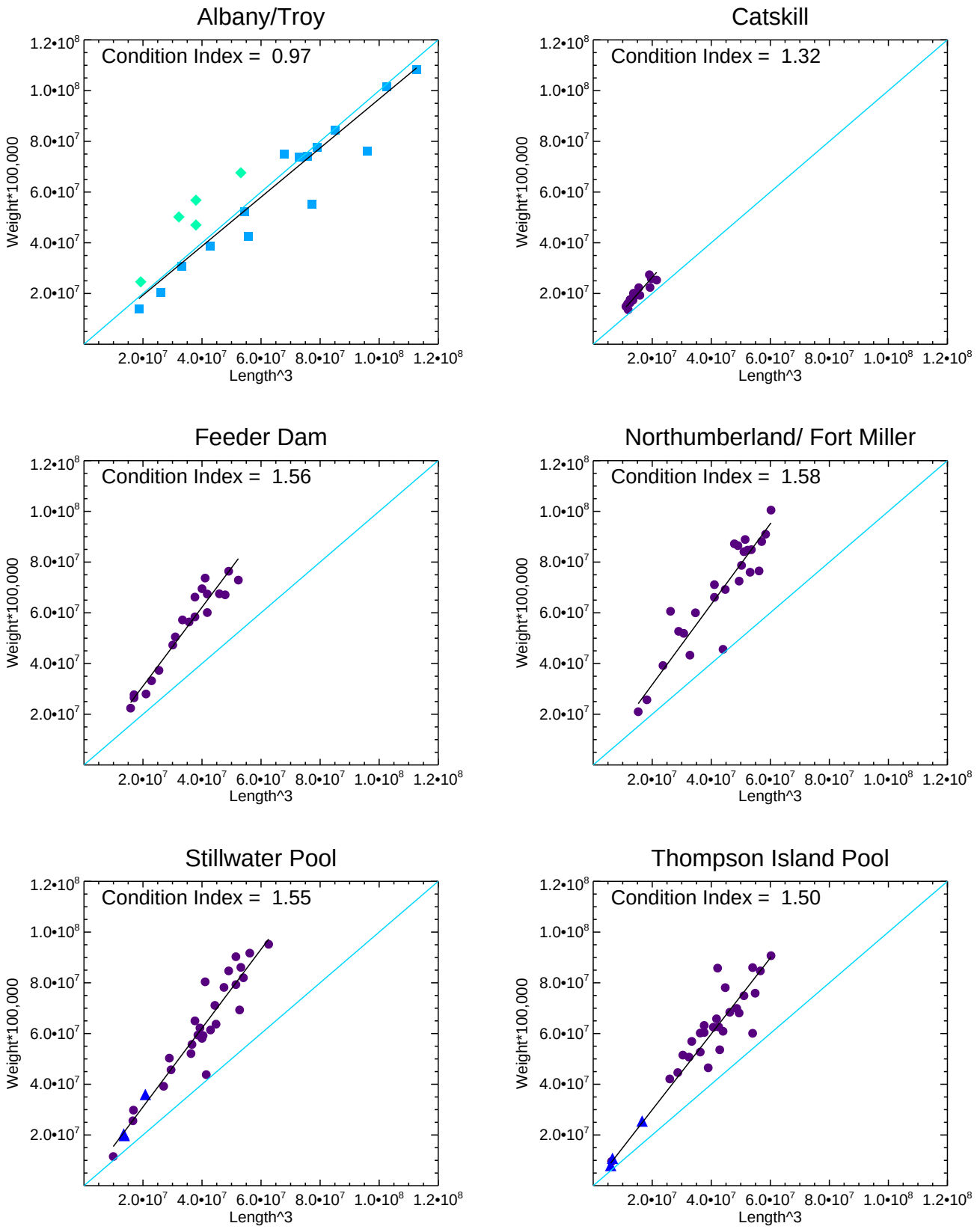



**Figure 4-11**

Condition Index of Ictalurids for Spring and Fall 2012 Sampling Events

Light blue line represents the 1:1 line.

2012 Water and Fish Data Summary Report

General Electric Company

JER - \\Helios\e_drive\Projects\GE_Hudson\RAMP\Working\RAMP_Fish\Analysis\Cross_Plots\2012\Condition_Index_by_spp_2012.pro

Mon Mar 18 11:37:11 2013

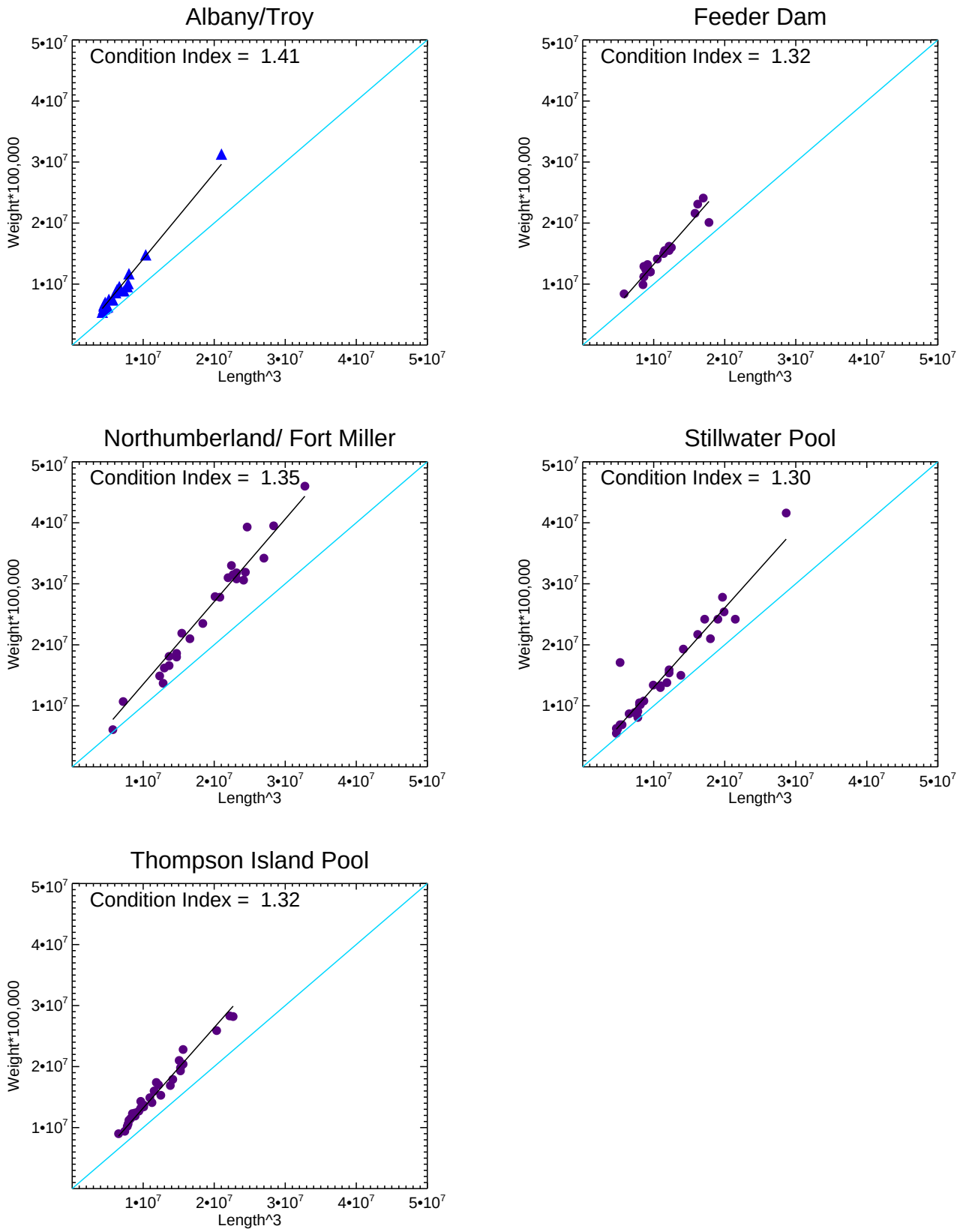
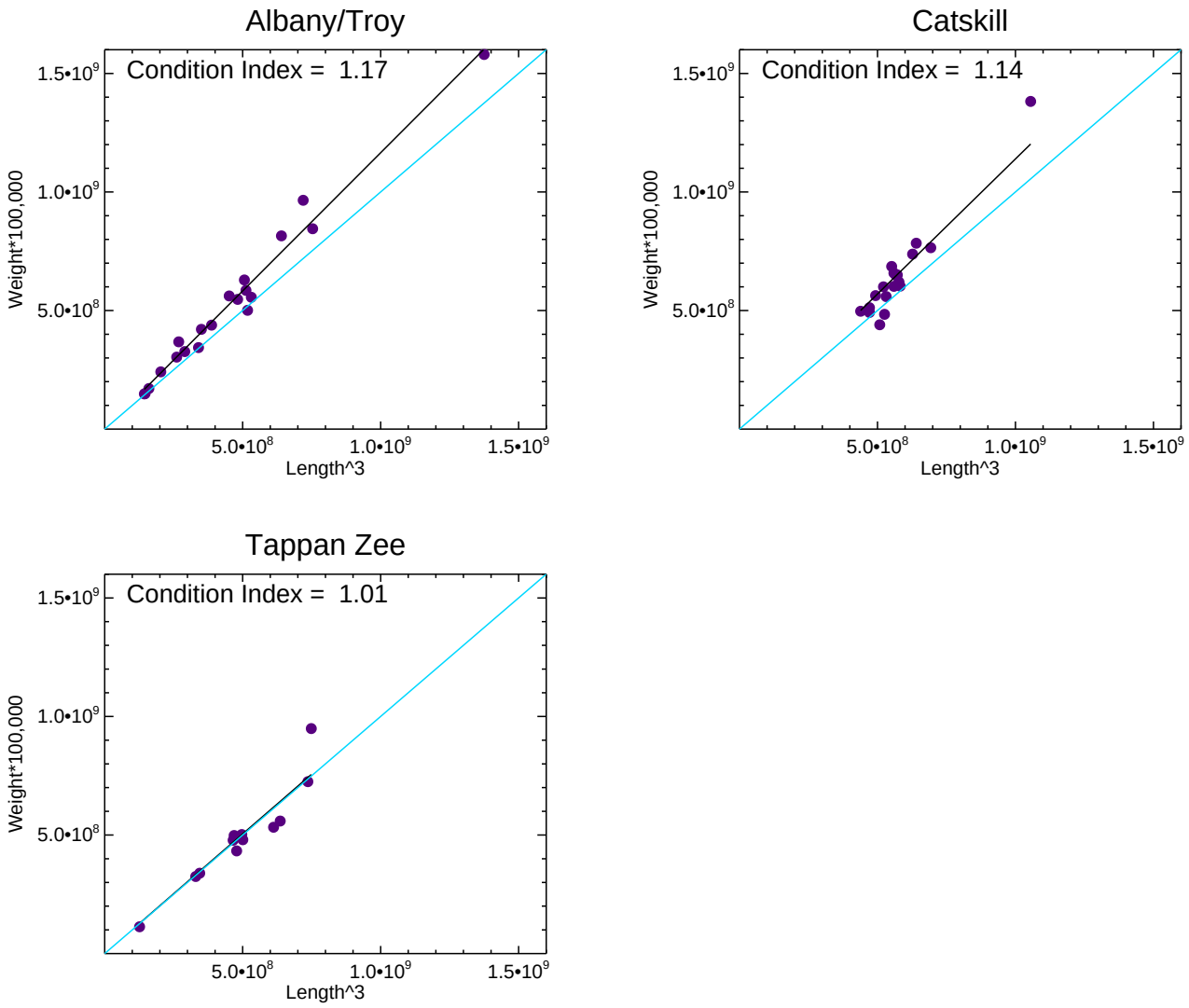



**Figure 4-12**

Condition Index of Perch for Spring and Fall 2012 Sampling Events

Light blue line represents the 1:1 line.

2012 Water and Fish Data Summary Report
General Electric Company




striped bass

**Figure 4-13**

Condition Index of Striped Bass for Spring and Fall 2012 Sampling Events

Light blue line represents the 1:1 line.

2012 Water and Fish Data Summary Report
General Electric Company

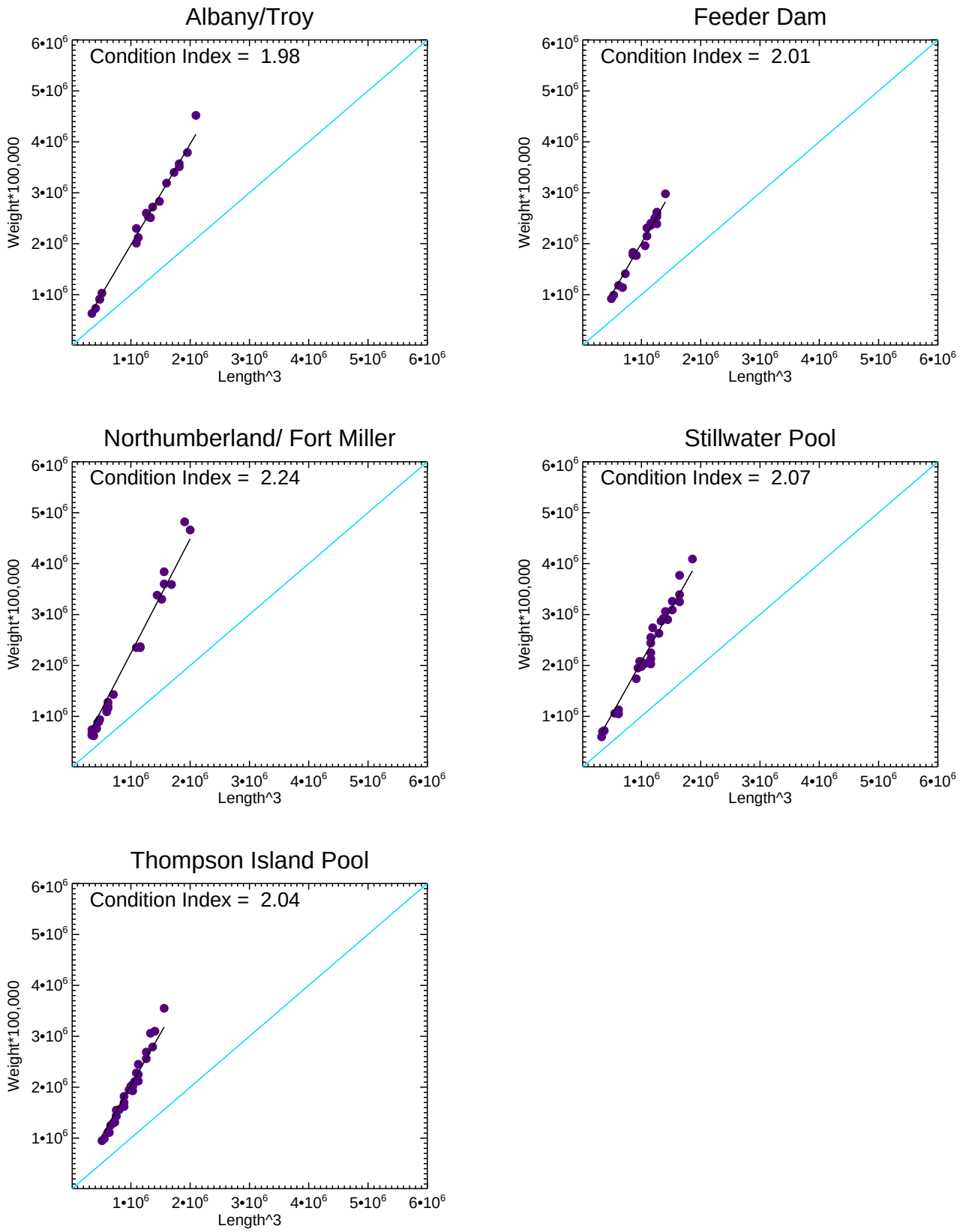


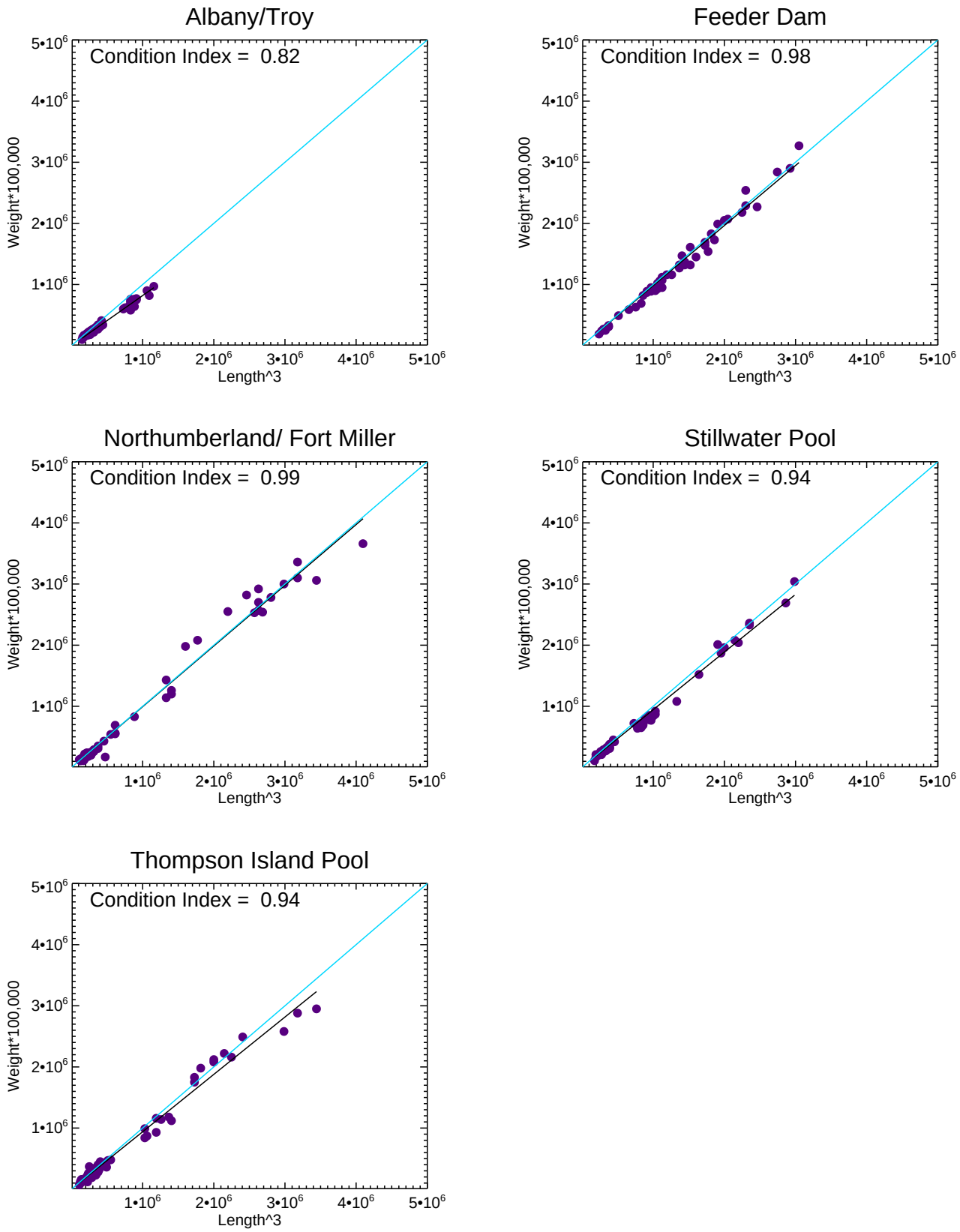

**Figure 4-14**

pumpkinseed

Condition Index of Pumpkinseed for Spring and Fall 2012 Sampling Events

Light blue line represents the 1:1 line.

2012 Water and Fish Data Summary Report
General Electric Company




forage fish

**Figure 4-15**

Condition Index of Forage Fish for Spring and Fall 2012 Sampling Events

Light blue line represents the 1:1 line.

2012 Water and Fish Data Summary Report
General Electric Company